REAUTHORIZATION OF THE NATIONAL BUREAU OF STANDARDS

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BEFORE THE

SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

UNITED STATES SENATE

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ON

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REAUTHORIZATION OF THE NATIONAL BUREAU OF STANDARDS

WEDNESDAY, MARCH 17, 1982

U.S. SENATE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:50 a.m., in room 235, Russell Senate Office Building, Hon. Harrison H. Schmitt (chairman of the subcommittee) presiding.

OPENING STATEMENT BY SENATOR SCHMITT

Senator SCHMITT. The hearing will come to order. I apologize for keeping witnesses and others waiting this morning.

We have this morning the opportunity to review the programs of the National Bureau of Standards and its many significant and too often unheralded contributions to our Nation's scientific and technological base. Today we will consider the proposed fiscal years 1983 and 1984 programs and budget proposals for the Bureau and also for the National Technical Information Service, along with a proposal to transfer the Institute for Computer Sciences and Technology to the General Services Administration.

Why anyone would want to transfer anything to the General Services Administration I do not understand, but we will look into it anyway. We are also interested in such issues as the proportion of NBS efforts to be devoted to basic research, the quality of instrumentation at NBS and the future of the NBS.

In 1982 the Congress has to make unusually hard decisions on the appropriate level of support for Federal programs during a period of economic recovery. We have to scrutinize programs; their performance, potential, and costs relative to their benefits. We have to pay particularly close attention to our scientific and technological activities which contribute so much to our future wellbeing and to our ability to sustain an economic recovery once it is with us. It is in this context that we examine the National Bureau of Standards and the Technical Information Service.

NBS, our oldest Federal laboratory, was created by Congress in 1901 to meet the needs of the Nation for a unified system of physical measurement. Additional legislative directives have broadened the NBS charter. NBS activities affect domestic and international trade, industrial and governmental productivity, public health and safety, as well as the general advancement of the basic sciences and technology.

NBS has specific responsibilities in many areas, including computer and data processing, materials sciences, fire research, radiation control, and energy and building technology. The Bureau performs an important public function by providing impartial technical opinions on the contributing factors and causes of certain disasters, such as the fire at the Las Vegas MGM Grand Hotel in 1980 and the collapse of the walkway at the Kansas City Hyatt Regency Hotel in 1981. These opinions are essential for improving safety as well as for helping establish legal liability.

The NBS assists Federal agencies with measurements and standards related to problems in technical programs. About one-third of the operating funds for the National Bureau of Standards comes from an interagency transfer for these services, that is, reimburseable funding.

The first part of today's hearings will focus on the National Bureau of Standards. We are fortunate to have witnesses with a variety of views on this agency. We have the leadership of NBS, the Chairman of the NBS Statutory Visiting Committee, the Chairman of the National Academy of Sciences Evaluation Panel for NBS and the author of a recent policy analysis of the National Bureau of Standards.

The second part will cover the National Technical Information Service, which is a clearing house for the collection and dissemination of scientific, technical and engineering information. Dr. Joseph Caponio, Acting Director of NTIS, will be the witness.

We will now have a panel discussion of the National Bureau of Standards with all four witnesses making their statements, followed with a question and answer period. I ask each of the witnesses to hold their remarks to under 10 minutes, hopefully 5. Summarize your statement. The written statements will be included in their entirety in our hearing record.

The first witness of the panel is Dr. Ernest Ambler, and joining Dr. Ambler is Mr. Raymond G. Kammer. Dr. Ambler, do you want to come forward, with Mr. Kammer, Dr. John D. Hoffman, and Dr. John W. Lyons.

If we have room, let's have Dr. Walters, dean, Weiss School of Natural Science at Rice University, Dr. Mildred S. Dresselhaus, the chairperson, steering committee of the Evaluation Panels for NBS, and Dr. Blankenship, Director of the Division of Budget and Planning Analysis of the National Science Foundation. If you would all work your way up, we will have your statements and then questions.

Dr. Ambler.

STATEMENT OF DR. ERNEST AMBLER, DIRECTOR, NATIONAL BUREAU OF STANDARDS, DEPARTMENT OF COMMERCE, ACCOMPANIED BY RAYMOND G. KAMMER, DEPUTY DIRECTOR; DR. JOHN D. HOFFMAN, DIRECTOR, NATIONAL MEASUREMENT LABORATORY; DR. JOHN W. LYONS, DIRECTOR, NATIONAL ENGINEERING LABORATORY; AND JAMES BURROUGHS, DIRECTOR, INSTITUTE FOR COMPUTER SCIENCES AND TECHNOLOGY

Dr. AMBLER. Thank you, Mr. Chairman. I am pleased to appear before you to request authorization for appropriations for the National Bureau of Standards for fiscal years 1983 and 1984. A copy of draft legislation was submitted to Congress on February 8. We are requesting $104,362,000 for fiscal year 1983 and such sums as may be necessary for 1984.

The 1983 amount includes $49,980,000 for measurement, research, and standards; $32,872,000 for engineering, measurement, and standards; and $21,510,000 for central technical support.

Our request does not include an authorization for the Institute for Computer Sciences and Technology. The administration has submitted legislation to the Congress which would transfer ICST to the GSA and funding for the 1983 activities of the ICST is included in the GSA's budget request.

There are several budget changes I would like to point out. Our request includes direct support for most of the Bureau's fire research work. In the past, the largest portion of this funding was appropriated to FEMA and passed through to NBS. A response to the Earthquake Hazards Reduction Act of 1977, which has also been partially funded by FEMA in the past, will be continued in 1983 with direct NBS funding of $475,000.

We are requesting program decreases in several areas consistent with the administration's desire to hold down Federal spending. Our environmental measurements program will not be continued in fiscal year 1983. This represents a decrease of $226,000. We expect EPA will provide industry and Government agencies with the necessary technical data and assistance in this area.

Our competence-building program for the development of basic competences for the future will be reduced by $1 million. At the reduced 1983 level of $7 million we will be able to continue an active program and all of our ongoing competence projects will be continued, although at slightly reduced levels.

The major objectives of our recycled materials program have been achieved to the point where the private sector may continue any further efforts needed to satisfy their specific requirements. This makes possible a $3.1 million reduction in our request for fiscal year 1983.

We are also reducing our direct funding of research on the properties of new-process metals and on automated manufacturing. Both of these are reductions to the fiscal year 1982 increases. In both cases we are able to use the 1982 funding to establish capabilities which can, with support from other agency funding and the private sector, be continued with lower levels of appropriated funds.

The amount requested for acquisition of an upgraded NBS computer, which was initially funded at the $9.3 million level in fiscal year 1982, will be reduced to $3.7 million in fiscal year 1983. This cut is made possible by a lease-purchase approach which will provide computing capability we need at lower annual cost.

Mr. Chairman, you asked in your invitation letter of February 11 about our accomplishments in providing technical support for industrial productivity. These programs are all designed to facilitate the prompt exploitation of new technologies through improved measurement methods, data, and standards.

Our semiconductor program focuses on very large scale integrated circuits, specifically to improve the quality and reduce the cost of testing such circuits. NBS measurement services are being very well received in professional and trade associations which are adopting standards based on NBS work. The goal of our materials research program is to facilitate more effective use by industry of a wide variety of materials.

In fiscal year 1982 we are expanding basic work underlying rapid solification and alloy coatings. These new processing technologies show promise of leading to new materials with properties superior to any that now exist.

In automation we are assembling a small experimental automation facility. This facility will be used to address the complex problems of measurements of both the machine and the work piece and of developing standards for the interconnection of design, manufacturing, and measurement systems.

Our chemical engineering program recently developed a computer code for predicting the transport properties of hydrocarbon mixtures over a wide range of industrial conditions. This code has been made available and is being widely used by industry for design of chemical processes and process equipment.

Your inivitation letter also, Mr. Chairman, inquired about the capabilities of our staff and about the adequacy of our equipment. The wide range and technical excellence of our progress in the programs I have mentioned in my written statement, I believe, are reflective of our staff's intellectual growth and excellence. The competence-building program has had an enormously positive effect on staff creativity over the past few years. I anticipate that this trend will continue.

With regard to equipment, we spent $10.9 million in fiscal year 1981. In fiscal year 1982 we are spending $11.5 million. With this funding and the $9.7 million we are requesting for fiscal year 1983, we are making steady progress toward meeting our laboratory equipment needs.

Finally, your letter asked about balance in NBS programs. With regard to contract research, we undertake such work only if it is congruent with our basic mission and only after careful scrutiny against the criteria for acceptance set out in my written testimony.

In fiscal year 1981 about 35 percent, $62 million, of the NBS budget was provided by other agency contracts. In fiscal year 1982 we estimate that such contracts will provide about 31 percent, $60 million.

With regard to the balance between our measurement and engineering efforts, these functions are performed by our two major laboratories—the National Measurement Laboratory and the National Engineering Laboratory. The heads of these laboratories, Mr. Chairman, are two of the people you mentioned accompanying me in your introduction.

The two laboratories are approximately equal in staff size and funding. In fiscal year 1982 other agency support will fund about 43 percent of the Engineering Laboratory's programs and about 26 percent of the Measurement Laboratory's programs. The difference in levels of other agency support is due to the nature of the two laboratories. Engineering work is somewhat more required by the shorter range needs of other agencies.

I must emphasize, however, that NBS has major mission responsibilities in both of these laboratories and it is essential that a healthy balance of direct and other agency funding be maintained in both.

Mr. Chairman, this concludes my statement. Thank you very much.

[The statement follows:]

STATEMENT OF DR. ERNEST AMBLER, DIRECTOR, NATIONAL BUREAU OF STANDARDS

Mr. Chairman and members of the Subcommittee: I am pleased to appear before you to request authorization of appropriations for fiscal years 1983 and 1984 for the National Bureau of Standards (NBS).

I am accompanied today by my Deputy Director, Mr. Raymond G. Kammer; Dr. John D. Hoffman, Director of the NBS National Measurement Laboratory; and by Dr. John W. Lyons, Director of the NBS National Engineering Laboratory.

AUTHORIZATION REQUEST

As you know, Mr. Chairman, the enactment of an authorization of appropriations for the activities of NBS is needed for fiscal year 1983 and beyond. On February 8, simultaneously with delivery of the President's fiscal year 1983 Budget, the Secretary of Commerce submitted draft legislation which would, if enacted, authorize appropriations for NBS and the National Technical Information Service (NTIS) for fiscal years 1983 and 1984. A copy of that draft bill, an accompanying Statement of Purpose and Need, and letters of transmittal to the Speaker of the House and the President of the Senate are attached.

We are requesting, in section 2 of our draft bill, authorization of appropriations, exclusive of funding for salary adjustments, of $104,362,000 for fiscal year 1983. This includes $49,980,000 for Measurement Research and Standards, $32,872,000 for Engineering Measurement and Standards, and $21,510,000 for Central Technical Support. For fiscal year 1984 we are requesting an authorization of such sums as may be necessary.

The request for NBS does not include authorization of appropriations for the NBS Institute for Computer Sciences and Technology (ICST). The Administration is proposing to transfer ICST to the General Services Administration (GSA) in fiscal year 1983. Thus, funding for the activities of ICST is included in GSA's budget request. The Secretary of Commerce and the Administrator of General Services have submitted, for consideration by the Congress, legislation, to vest the Secretrary's responsibilities regarding automatic data processing and computer-related standards with the Administrator. This will place most or the Government's automatic data processing program with the Administrator. If Congress approves the transfer of the Secretary's functions, ICST will be transferred to the Administrator. The Administrator, under section 603(a) of the Federal Property and Administrative Services Act of 1949, has a continuing authorization of appropriations for activities of this type. Thus, no specific authorization of appropriations will be required.

I would now like to point out several changes in the budget request for NBS for fiscal year 1983.

Our budget request includes direct support for most of NBS' fire research activities. In the recent past, the largest portion of this funding has been appropriated to the Federal Emergency Management Agency (FEMA) and then passed through to NBS. Funding for this work has now been transferred from the FEMA budget request to ours.

Our Environmental Measurements Program will not be continued in fiscal year 1983. This program has been involved with long-term research toward the development of techniques for measurement of chemicals introduced into the environment. $226,000 was provided for the program in fiscal year 1982. This reduction will eliminate direct appropriations for this program which was previously reduced by $2 million in fiscal year 1979. We expect that EPA will continue to provide industry and government agencies with the necessary technical data and assistance.

Our Competence Building Program for development of the Bureau's basic scientific competencies for the future is being reduced by $1 million in fiscal year 1983. At the reduced level of $7 million, NBS will still be able to continue a very active and productive program. All ongoing competence projects will be continued, although at slightly reduced levels.

Our recycled materials program has been concerned for several years with identification and investigation of technical problems encountered in the recovery and reuse of waste materials. The major objectives of the program have been achieved to the point where it is now appropriate for the private sector to continue further efforts to satisfy their specific requirements. This makes possible a $3.1 million reduction in our request for fiscal year 1983.

We are also reducing our direct funding for research on the properties of new-process metals and on automated manufacturing. Both of these reductions are to increases approved in fiscal year 1982. In both cases we were able to use the 1982 money to establish a capability which could be continued with lower levels of appropriated funds. Other-agency funding and cooperation with the private sector will make possible a continuation of these programs.

The amount requested for acquisition of an upgraded NBS computer, initially funded at the $9.3 million level in fiscal year 1982, has been reduced by $5.6 million to $3.7 million for fiscal year 1983. In this case, we have evaluated leasing versus outright purchase of certain system components and are confident that a combination of purchase and lease will permit us to move ahead with the acquisition of the computer capability we need, but at a lower annual cost.

Section 4 of our draft bill provides an authorization of appropriations for pay raises and adjustments to base to offset the impact of inflation. Section 5 would authorize the carryover of funds beyond the end of the fiscal year for which they are authorized.

I will not discuss section 3 of our draft bill. This section would authorize appropriations for the National Technical Information Service (NTIS). NTIS is not part of NBS, but is subject to reauthorization by this Subcommittee. Dr Joseph Caponio, Acting Director of NTIS, will testify in support of that section.

STAFF CAPABILITIES AND ACCOMPLISHMENTS

I would now like to highlight for you some of our technical accomplishments during the two years since our last authorization hearings, and discuss some new capabilities that we have developed during this period. We are continuing to pursue vigorously core activities in research and development leading to, and supportive of, measurement services, critical data evaluation, and the provision of standard reference materials for a broad range of industries and public organizations.

The need for more precise and accurate time information continues to grow. Satellite telecommunication systems, including military communications, navigation systems, and fields of science, such as radio astronomy, are examples of areas having such needs. In response, NBS has recently developed and tested a new time scale measurement system. This system allows significant improvement in the performance of clock measurement equipment. The system uses an NBS invention which won an Industrial Research I-R 100 Award. Tests just completed on the system demonstrate that it is more than 10 times more accurate than previous systems. This new system should prove to be the most effective solution to the common problem of intercomparing three or more clocks. The hardware is available from a commercial vendor and can now come into rapid and widespread use.

Another significant activity during the past year was our investigation of the collapse of two walkways at the Hyatt Regency Hotel in Kansas City. NBS was called upon to perform this investigation because of its reputation for third-party impartiality, its measurement expertise, and its recognized competence in the field of structural engineering. Our assistance was first requested on July 20, 1981, three days after the collapse, by Senator Eagleton. On July 22, 1981, Mayor Berkley of Kansas City formally requested that NBS ascertain the most probable cause of the collapse of the Hyatt Regency walkways. Shortly thereafter, in a letter to Mayor Berkley, Senators Eagleton and Danforth and Congressman Bolling endorsed the Mayor's request for NBS assistance. On February 25th, we released a technical report describing the results of our investigation of the collapse. Our report focuses on the technical reasons for the collapse. The response to it has been most favorable.

Calibration services continue to be a major technology transfer mechanism for NBS. Needed services are provided to industry, universities, and other government agencies, and new ones are developed for emerging or changing technologies. An example of this is the development of ultraviolet radiation standards at NBS over the last 10 years. This has been in response largely to increased requirements from the space science community and the controlled thermonuclear fusion community. Now virtually all quantitative radiation measurements from rockets and satellites depend upon NBS radiometric standards. The next space shuttle will carry an experiment with an on-board standard source calibrated by NBS. This flyable standard, developed in a collaborative effort between NBS, the National Physical Laboratory (NPL) in England, and the Naval Research Laboratory (NRL), represents a major step forward in accuracy, reliability, and economy when compared to previous methods of calibrating optical systems in space, e.g., the use of auxiliary calibration rockets.

Another example of a recent development in measurement services is the initiation of a new calibration service at NBS for analog-to-digital (A/D) and digital-to-analog (D/A) data converters. This service marks the entry of NBS into the area of providing direct calibration support for signal-processing electronic components. These are vital components of modern measurement equipment. A/D and D/A converters, for example, link the real world of analog phenomena to the world of digital computing and data processing. The new calibration service will support a class of devices with an estimated market this year of $600 million.

We are also strengthening the NBS Office of Weights and measures (OWM). The recent introduction of new technology into the marketplace has created new needs for techmical support from NBS. As a consequence, we are taking steps to respond to these needs in spite of existing budget constraints. For fiscal year 1983, we are increasing the funding for the Office of Weights and Measures (OWM) by 50 percent. We are also working closer with the National Conference on Weights and Measures to ensure that OWM's programs are responsive, and to discuss how State and local officials, scale manufacturers, and the Bureau might work together, to meet weights and measures needs in domestic and international commerce. During the week of January 25, we met with committees of the National Conference on Weights and Measures at NBS. We briefed them on our resources and plans and held extensive discussions. I personally met with several of the Conference leaders, as well as with State officials and with industry representatives. I intend to continue this close working relationship with the weights and measures constituency in the future, and have in fact made OWM part of my office.

Among other accomplishments, we have:

Developed a measurement technique for nondestructive isotopic mass analysis utilizing resonance neutron radiography. The accuracy far exceeds that presently available in many measurement situations encountered in safeguarding nuclear materials. The technique may also be applied in industrial situations such as quality control of solder joints on a production line, or on-line assay of a feed stream of nonuniform heavy metal ore.

Developed a new dosimetry standard with a wide exposure range for high intensity electron and photon radiation fields at dose levels used in medical therapy. This standard, a water calorimeter, has the advantage over graphite calorimeters in that no theoretical modeling is required to convert the measurements to the response of water which is the major constituent of the human body.

Developed a new method employing electrochemical and optical techniques, to investigate corrosion of metals under protective coatings simulating paints. The measurement method has application both in research on the basic processes of corrosion and in the systematic testing of various corrosion inhibitors.

Developed crack growth tests based on evaluating forces at a crack tip. These tests are applicable for the evaluation of structural metals used, for example, in bridges and airplanes;

Conducted a measurement intercomparison, among manufacturers of optical fibers, of the most significant parameters for characterizing optical fibers, dispersion and attenuation. Reliable measurement procedures are necessary for improvements in industry's ability to provide high quality optical fibers;

Developed a new method for probing directly into flames with laser scattering techniques. Stable molecules and chemical intermediates have been measured with greatly enhanced sensitivity and, for the first time, submicroscopic particles that may be the building blocks of soot have been detected. The measurement method will help to determine smoke formation processes and enable fundamental advances in fire research.

Developed a calculational technique to predict the thermophysical and transport properties of broad classes of complex industrial fluid mixtures. Such mixtures can include, for example, chemicals, natural and synthetic gases, and oil shale liquids. The technique, called TRAPP, is based on the properties of a pure fluid, and provides predicted properties via the theory of corresponding states.

These are just a sample of the many accomplishments of our staff during the last two years.

MEASUREMENT RELATED RESEARCH IN SUPPORT OF INDUSTRIAL PRODUCTIVITY

I would like to describe to you several new programs in areas of technology that are of increasing importance to the strength of the U.S. economy. The plans for these programs were worked out over the past few years through interactions with the Congress, numerous contacts with industry, and through cooperation with professional and industrial associations. These programs are in semiconductor electronics, materials science, automated manufacturing, and chemical engineering. The programs are designed to reduce or remove, through improved measurement methods, data, or standardization, technical barriers that impede the prompt introduction or exploitation of new technologies.

The semiconductor electronics program focuses on very large scale integrated (VLSI) circuits and on the electrical and dimensional measurements, needed to facilitate manufacturing and marketing semifinished and finished VLSI circuit products. The program was planned, and is being conducted, in close cooperation with industry. NBS' measurement services are being very well received, and professional and trade associations are adopting documentary standards based on NBS work. Training courses have been held to facilitate the transfer of measurement technology. We are making significant progress in developing methods and protocols for testing microchips containing very complex electronic circuitry. These will improve quality control and reduce the costs of testing. For example, the standard reference material developed for linewidth measurements of circuit dimensions has been a major benefit to the electronic industry. It is the most sophisticated and expensive SVM produced at NBS. Over 40 have been sold to major electronic firms and to secondary standards laboratories who are now working on manufacturing cheaper, although less precise, laboratory versions.

The materials science program provides industry with measurement methods, data, and standards for characterizing the physical, chemical, and mechanical properties of materials. The goal of the program is to facilitate more effective use by industry of a wide variety of materials. The methods, data, and standards developed provide invaluable support to industry in materials selection, design, and processing. In fiscal year 1982, we are expanding this program to include work on rapid solidification and alloy coatings. These new processing technologies show promise of leading to new materials with properties superior to any that now exist. NBS will focus on the scientific basis and the fundamental understanding of such phenomena as diffusion rates, alloy phase stability, and wear and corrosion resistance, all of which are needed to design and make new materials, compositions, and structures. Industry's view of the importance of this program is evidenced by their $4 million commitment to a cooperative effort between NBS and the American Society of Metals in the area of alloy phase diagrams.

The automated manufacturing program addresses the problems of dimensional measurements of manufactured parts. The program is developing the very complex standards needed to facilitate the interconnection of many computer-controlled machine tools, test stations, robots, and conveyors into one automated manufacturing system. As part of this project we are setting up a small automated manufacturing system to be used as an experimental facility to develop and verify measurement and interconnection methods. An example of a significant technical development in measurement science in this area is the development of a nondestructive measurement technique that can be used to predict drill bit failure in numerically controlled machine tools and similar automated systems. An accelerometer is magnetically attached to the surface of the piece being drilled and the vibration spectrum is analyzed by a small microprocessor to predict imminent failure. Over 200 inquiries have been received for information on the technical details of this system.

The chemical engineering program was developed after discussing measurement needs and technological barriers with over 100 chemical companies. The program provides methods for predicting the physical properties of complex mixtures, measurement methods for process control, measurement standards, and calibration services for equitable exchange of commercial liquids and gases. The chemical engineering program has recently developed methods and a computer code for predicting the transport properties of hydrocarbon mixtures over a wide range of industrial conditions. This code has been made available and is being widely distributed to industry for design of chemical processes and process equipment.

In the interest of further improving our interactions with industry, we intend to expand our longstanding industrial research associate program. This program currently enables about 100 scientists and engineers from private companies, trade and professional associations, and other organizations to come to NBS and participate in cooperative research projects. These associates are paid by their sponsoring employers or organizations rather than by NBS. We hope to increase this program's size by 10 percent by the end of fiscal year 1982, and to double it within the next five years. We have more than 200 projects suitable for collaboration and are especially interested in having research associates participate in our newer programs. We are expanding the program because of its demonstrated benefits. The program gives research associates the opportunity to develop, learn, and take new skills back to their companies and organizations. It allows them to benefit from the use of NBS facilities and from collaborations and consultations with the NBS professional staff. At the same time, NBS receives the services of highly trained professionals and learns first-hand the views and needs of the industrial community. In these times of tight Federal budgets and competitive industrial challenges from abroad, such cooperation between government and industry is crucial.

AREAS OF ADDITIONAL CONGRESSIONAL CONCERN

I would now like to discuss a number of additional areas which have been of special interest to the Congress.

First, I will review the Reduction In Force (RIF) situation at NBS. As you know, NBS, like most Federal agencies, has been required to reduce its overall personnel ceiling. Specifically, a reduction of 369 positions was to be achieved at NBS by the end of fiscal year 1982. Of this total, a reduction of 108 positions was achieved under a 2 for 1 hiring freeze. A reduction of an additional 115 positions is being achieved through voluntary attrition. The remaining reduction of 146 was achieved through a Reduction in Force which began in the spring of 1981.

To minimize the hardship on the affected employees, we conducted a job assistance program throughout the RIF process. About 60 percent, or 160 of the employees who were displaced, participated in the program, as did 76 percent of the employees who were separated for reasons other than retirement. This was an extremely successful program, and I intend to continue it as long as there is a need.

In fiscal year 1982, we are not reducing any more technical positions supported by appropriations to the Secretary for the conduct of Bureau activities. However, we are conducting RIF of about 25 administrative positions. This action is being taken partly in response to the Secretary's goals of reducing the cost of overhead and support functions, and partly to meet large unbudgeted expenses in fiscal year 1982 (e.g., pay raise absorption and increased cost of utilities) and to preserve the level of support of our technical programs.

Mr. Chairman, in your letter of invitation, you asked about the adequacy of NBS' equipment and instrumentation. The problem of providing adequate funding for replacing obsolete equipment and for equipping new projects is a continuing one, but we feel that we are making progress. In fiscal year 1981, a total of $9.4 million was spent on new equipment. In fiscal year 1982, we are spending $10.2 million, and for fiscal year 1983, we are requesting $10.6 million. With this funding we expect to be able to continue to provide reliable service and to modernize our laboratory equipment.

With regard to our efforts toward upgrading NBS' computing capability, a transition computer, a UNIVAC 1100/82, was deliverd last month. A Request For Procurement (RFP) for a computer to replace NBS' main computer was released in December 1981. The schedule for procuring the replacement computer calls for proposals responding to the RFP to be returned to NBS by March 1982. Contract award is scheduled for September 1982, with delivery scheduled for 1983. NBS will run its scientific computing on the UNIVAC 1100/82 transition computer until early fiscal year 1984 when the replacement computer is expected to be fully operational. The 1100/82 will continue to be used for NBS administrative computing and for other DOC computer requirements. The schedule may slip, however, because Congressman Brooks has requested a 60-day study by the General Accounting Office of the planned requistions of scientific computers by NBS and NOAA to see if economies may be affected by some form of consolidation. This review should be complete by mid-March.

I have already said much about the basic capabilities of the technical staff but I would like to add here some comments on the competence building program that was initiated in 1979 to enhance the scientific competence of NBS. I feel that this program has had an enormously positive effect on the creativity and overall tone of the Bureau. It allows some of our most creative researchers an opportunity to explore the fundamental questions which we anticipate will have great practical significance in the coming decades. It also helps to attract top technical talent to build a strong staff for the future. The competence increases in fiscal years 1979 through

1982 put us in a much stronger position to meet the nation's future needs for NBS services.

Mr. Chairman, I would like also to address your concern about the level of other agency contract work done at NBS. Other agency or contract work is taken on only if it is congruent with the Bureau mission as specified in the Organic Act. A set of eight criteria has been developed to determine the appropriateness of the work.

These criteria are:

1. The work is done to establish traceability of measurements to national standards.
2. Standards, codes, and test methods are developed that relate to items purchased by the Government or are important to the public interest.
3. The work is specifically authorized or mandated by legislation.
4. The work must be done in an objective way and, if done elsewhere, would result in conflicts of interest.
5. Accuracy requirements cannot be met by other sources.
6. Capabilities or facilities needed for the work are unique to NBS.
7. There is a requirement for timeliness that can be met.
8. There is a clear advantage in lower costs to the Government.

In fiscal year 1981, the total NBS budget was $178 million; $62 million, or 35 percent, was other agency contract work. In fiscal year 1982, the total budget is estimated to be $191 million; $59 million, or 31 percent, will be provided by other agency contracts.

Also important to the institutional health of NBS is the appropriate balance of efforts between Measurement Research and Standards, and Engineering Measurements and Standards. The two major laboratories at NBS, the National Measurement Laboratory (NML) and the National Engineering Laboratory (NEL), carry out the research and development in these areas. They are approximately of equal size with respect to total resources and number of staff. In fact, we are projecting, that at the end of fiscal year 1982, NEL will have 1044 full-time equivalent staff members, and NML will have 1017. Both laboratories are essential to carrying out the NBS mission and have developed core expertise in response to the Organic Act. It is an indication of our interest in maintaining a proper balance that the competence building research projects, selected to build up our core capabilities, were equally divided between the two laboratories. In fiscal year 1982, other agency support will provide about 43 percent of the NEL operating funds and about 26 percent of the NML funds. The difference in the level of other agency funding in the two laboratories is due essentially to the nature of laboratories. Engineering work is closely tied to changing technology, where timeliness of response, made possible often only by supplementary funding, is essential to meet the measurement needs of the engineering community. On the other hand, activities in NML often have longer range objectives where it is essential to have continuous in-house support, complemented to a lesser extent by other agency funds. NBS has a responsibility in both of these core areas and intends to maintain a healthy balance.

INTERNATIONAL ACTIVITIES

Before concluding I would like to discuss the results of amendments to the Organic Act affecting our international activities which were made by the Congress as part of our last reauthorization. The NBS Authorization Act for fiscal years 1981 and 1982 amended the NBS Organic Act to provide the Secretary with expanded authority for NBS' participation in international activities. This new authority allowed the Secretary to use appropriated funds and other forms of assistance such as fellowships to defray the expenses of foreign scientists while they are performing scientific work at NBS of mutual interest and benefit. During the calendar year 1981, 32 guest workers were assisted under this new authority. These workers delivered 208 man-months of research effort to NBS that would not have been otherwise available. Because of the cost-sharing with the guest workers' home agencies, their services cost NBS only about ⅕th as much as would be required for payment in full.

Another amendment to our Organic Act permits NBS employees to accept remuneration from foreign governments for their air transportation and subsistence expenses while working in foreign laboratories. During 1981, NBS received reimbursements and fellowships which amounted to about $135,000 and made possible important communications with foreign scientists that NBS would not have had otherwise.

Mr. Chairman, the amendments to our Organic Act, made as part of our last authorization, have been, and will continue to be, most beneficial to NBS; they will help us to maintain a current awareness of new developments at the forefront of science and technology on a worldwide basis. The Subcommittee showed commendable foresight in obtaining their enactment.

While on the subject of international activities, I would note that NBS, in August 1981, entered into an agreement with the U.S. Agency for International Development. Under that agreement NBS will provide technical assistance to the Egyptian National Institute of Standards and the Egyptian Organization for Standardization and Quality Control. The objective of this effort is to enhance the abilities of these organizations to provide services for protection of the health and safety of the Egyptian people and to promote Egyptian manufacture of high quality products that will meet international standards.

NBS cooperation with its counterparts in the People's Republic of China (PRC) is also increasing. In May, 1979, an agreement was signed between the Department of Commerce and the PRC State Bureau of Metrology (SBM) for cooperation in measurement and standardization. Under this agreement, we have embarked on a five-year program of cooperation between NBS and SBM. Thus far, seven Chinese scientists have carried out research projects in NBS laboratories and seven NBS technical experts have gone to China to deliver lectures and visit laboratories. The technical fields in which these scientists have worked include electrical measurements, optical measurements, ionizing radiation measurements, standard reference materials, and analytical chemistry.

CONCLUSION

Mr. Chairman, NBS has undergone some significant changes during the two years since our last reauthorization. While NBS by the end of fiscal year 1983 will have undergone significant reductions in both staff and programs, I believe that our general level of accomplishment has been, and will remain, outstanding. In recognition of the critical role of the National Bureau of Standards to the economic well-being of the country, Secretary Baldrige has directed that I report directly to him. This upgrading reflects the enhanced stature and responsibility of the Bureau within the framework of the Department of Commerce.

I look forward to working with your Committee toward greater achievements in the future. Mr. Kammer, Dr. Hoffman, Dr. Lyons and I will be pleased to answer any questions you may have.

SECRETARY OF COMMERCE,
Washington, D.C., February 8, 1982.

Hon. GEORGE BUSH,
President of the Senate, Washington, D.C.

DEAR MR. PRESIDENT: Enclosed are six copies of a draft bill: To authorize appropriations to the Secretary of Commerce for the programs of the National Bureau of Standards for fiscal years 1983 and 1984, and for other purposes; together with a statement of purpose and need in support thereof for consideration by the Senate.

We have been advised by the Office of Management and Budget that there is no objection to the submission of this legislation to the Congress from the standpoint of the Administration's program and that enactment of this legislation would be in accord with the program of the President.

Sincerely,

MALCOLM BALDRIGE, *Secretary of Commerce.*

Enclosures.

A Bill to authorize appropriations to the Secretary of Commerce for the programs of the National Bureau of Standards for fiscal years 1983 and 1984, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Bureau of Standards Authorization Act for Fiscal Years 1983 and 1984".

AUTHORIZATION FOR PROGRAM ACTIVITIES

SEC. 2. There are authorized to be appropriated to the Secretary of Commerce to carry out activities performed by the National Bureau of Standards for the following line items:

(a) Measurement Research and Standards, $49,980,000 for fiscal year 1983, and such sums as may be necessary for fiscal year 1984;

(b) Engineering Measurements and Standards, $32,872,000 for fiscal year 1983 and such sums as may be necessary for fiscal year 1984; and

(c) Central Technical Support, $21,510,000 for fiscal year 1983 and such sums as may be necessary for fiscal year 1984.

NATIONAL TECHNICAL INFORMATION SERVICE

SEC. 3. In addition to the sums authorized to be appropriated by section 2 of this Act, there are authorized to be appropriated to the Secretary of Commerce $1,980,000 for fiscal year 1983 and such sums as may be necessary for fiscal year 1984 to carry out activities performed by the National Technical Information Service.

SALARY ADJUSTMENTS

SEC. 4. In addition to the sums authorized to be appropriated by sections 2 and 3 of this Act, there are authorized to be appropriated for each of the fiscal years 1983 and 1984 such additional sums as may be necessary to make any adjustments in salary, pay, retirement, and other employee benefits which may be provided for by law, and, if the full amount necessary to make such adjustments is not appropriated, the adjustments shall be made proportionately from section 3 and from the line items in section 2 in a manner reflecting the extent to which the amount of section 3 and of each line item in section 2 is attributable to employee benefits of the type involved.

AVAILABILITY OF APPROPRIATIONS

SEC. 5. Appropriations made under the authority provided in this Act shall remain available for obligation, for expenditure, or for obligation and expenditure for periods specified in the Acts making such appropriations.

STATEMENT OF PURPOSE AND NEED

The National Bureau of Standards (NBS), the Nation's oldest national laboratory and lead agency for measurement science and standards, was created by the Act of March 3, 1901 (Pub. L. No. 56-177; 15 U.S.C. 271-278h) (hereinafter cited as the "Organic Act" or "Act"). Pursuant to that Act, the Secretary of Commerce is authorized to undertake certain functions including: the custody, maintenance, and development of the Nation's standards of physical measurement and provision of means and methods for making measurements consistent with these standards; the determination of physical constants and properties of materials; the development of methods for testing materials, mechanisms, structures, supplies and equipment; cooperation with other Federal agencies and the private sector in the establishment of standard practices; the provision of advisory services to government agencies on scientific and technical problems; and the invention and development of devices to serve special national needs.

Since its creation in 1901, and until fiscal year 1979, the Organic Act served as a continuing authorization of appropriations for Organic Act activities. In 1978, the Congress in Public Law No. 95-322 amended section 18 of the Organic Act (15 U.S.C. 278h) to limit to fiscal years 1979 and 1980 the period for which appropriations under the Act were authorized. In 1980, the Congress in Public Law No. 96-461 repealed that amendment thus restoring the continuing authorization of appropriations for Organic Act activities. However Public Law No. 96-461 also limited to fiscal years 1981 and 1982 the authorization of appropriations for all of NBS' activities and operations including those performed under the Organic Act and under other statutes such as the Standard Reference Data Act (15 U.S.C. 290-290f) and section 5(d) of the Earthquake Hazards Reduction Act of 1977 (42 U.S.C. 7704(d)). Public Law No. 96-461 also specifically included an authorization of appropriations limited to fiscal years 1981 and 1982 for those activities of the National Technical Information Service (NTIS) which are funded by appropriations. The primary purpose of this bill is to extend through fiscal years 1983 and 1984 the authorization of appropriations for the Bureau and NTIS.

Section 2 authorizes appropriations to the Secretary of Commerce to carry out the following line item activities of the National Bureau of Standards: $49,980,000 for fiscal year 1983 and such sums as may be necessary for fiscal year 1984 for Measurement Research and Standards; $32,872,000 for fiscal year 1983 and such sums as may be necessary for fiscal year 1984 for Engineering Measurements and Standards; and $21,510,000 for fiscal year 1983 and such sums as may be necessary for fiscal year 1984 for Central Technical Support. These items include NBS' Organic Act activities (including fire research activities conducted under the authority of amendments to the NBS Organic Act made by section 18 of the Federal Fire Prevention and Control Act of 1974) and NBS' activities under other statutes such as the Standard Reference Data Act and section 5(d) of the Earthquake Hazards Reduction Act of 1977.

Section 3 authorizes appropriations for the National Technical Information Service. The Act of September 9, 1950 (64 Stat. 823–824; 15 U.S.C. 1151–1157) directed the Secretary of Commerce to establish a clearinghouse for the collection and dissemination of scientific, technical and engineering information. The Secretary established, within the National Bureau of Standards (NBS), the Clearinghouse for Federal Scientific and Technical Information to perform the clearinghouse function. Later, through issuance of Department Organization Order 30–7A in September 1970, the Secretary created a new operating unit of the Department of Commerce, the National Technical Information Service (NTIS), and reassigned the clearinghouse function to it.

NTIS is the central source for the public sale of research, development and engineering reports and other analyses prepared by Government agencies, their contractors and grantees, and selected non-Governmental entities. It is also the central source for sales of Government-generated computer-processable data files. Pursuant to Section 3 of the Act of September 9, 1950 (15 U.S.C. 1153), NTIS sells its products and services on a self-sustaining basis. Gross sales are about $22 million annually. Eighty-five percent of revenues come from sales to the public; the remainder derives from sales to Government agencies.

NTIS also performs a few activities funded by appropriations. The Congress in Public Law No. 96–461 authorized appropriations for these activities of the National Technical Information Service for fiscal years 1981 and 1982 and to pay the first year costs of a two-year program to modernize NTIS's computer system. Section 3 of this bill authorizes the appropriation to the Secretary of Commerce of $1,980,000 for fiscal year 1983 and such sums as may be necessary for fiscal year 1984 to carry out those programs and activities of NTIS which are funded by appropriations and to pay the second (final) year costs of the two-year NTIS computer system modernization program.

Section 4 authorizes the appropriation of such additional sums as may be necessary to make any adjustments in salary, pay, retirement, and other employee benefits which may be provided for by law. If the full amount necessary to make such adjustments is not appropriated, then section 4 provides that the adjustments be made proportionately from section 3 and from the line items in section 2 in a manner reflecting the extent to which the amount of section 3 and of each line item in section 2 is attributable to employee benefits of the type involved.

Section 5 provides that appropriations made under the authority provided in this Act shall remain available for obligation, for expenditure, or for obligation and expenditure for periods specified in the Acts making such appropriations. The final determination whether to limit the availability of an appropriation to a single year or on a multiple-year basis is made when an appropriation bill is enacted by the Congress. An appropriation bill providing for other than a single-year availability would be subject to a point of order if an authorizing statute had not previously been enacted. Section 5 of this bill provides this necessary authority. In addition most research and development organizations are subject to uncertainties inherent in research programs, to a high incidence of unpredictable factors that compel the readjustment of program activities, and to the need for flexibility to permit prompt response to changed circumstances. Section 5 also provides for this necessary flexibility for the scientific and engineering research programs of NBS.

[The following information was subsequently received for the record:]

QUESTIONS OF THE COMMITTEE AND THE ANSWERS THERETO

Question. Strong U.S. computer equipment and computer peripheral equipment industries are extremely important to U.S. defense and various civilian sectors and to international trade. These industries are purported to lack many standards making it difficult for users, including Federal agencies, to employ software and hardware from different vendors. The absence of standards might affect the strength of these industries relative to foreign industries.

Is there a need for greater standardization?

Answer. The need for ADP standards will continue as the Federal Government continues to expand its uses of ADP to carry out essential programs and services. Large corporate users of ADP are beginning to realize that they, too, need standards to enable them to intermix equipment bought from different manufacturers. Both

Federal and private sector users will benefit in cost savings and wider choices in the selection of equipment when off-the-shelf products of different manufacturers can communicate with each other.

Question. What should be the NBS role in helping develop such standards for Federal and for nonfederal purposes?

Answer. The responsibilities performed by ICST under Section 111 of the Federal Property and Administrative Services Act of 1949 are, strictly speaking, limited to Federal agencies. Although the Federal Government is still the single largest ADP user, its share of the ADP equipment market is only about 7 percent—no longer the dominant factor it used to be 15 years ago. ICST manages to contribute to the development of general ADP standards by working with private sector users and vendors in voluntary standards development activities both nationally and internationally. As an objective participant in standards development, ICST has been able to examine proprietary manufacturer specifications and to negotiate agreements that narrow the differences between different manufacturers' equipment. This role has been supported by the manufacturers who want to compete in the worldwide ADP market but who must not take actions that could violate antitrust laws. ICST has been able to lead and encourage critical standards development efforts by developing and submitting technical specifications that become the basis for proposed standards and by testing standards implementations.

Question. Does NBS or the Institute for Computer Sciences and Technology (ICST) have adequate legislative approval to develop non-Federal standards or does existing legislation need to be modified?

Answer. Section 111 of the Federal Property and Administrative Services Act of 1949 provides the legislative authority for ICST to conduct Federal standards development activities. ICST carries out its responsibility to develop ADP standards by working with private sector users and manufacturers in voluntary standards development activities. As a result of this activity, ICST contributes to the technical development of standards that are adopted by non-Federal organizations as well as by Federal Government. Present legislation and policy guidance from the Office of Management and Budget provide the flexibility for such activities.

Question. The NBS Budget request for fiscal year 1983 proposed transferring ICST from NBS to the General Services Administration (GSA) and reducing the funding by 42 percent from fiscal year 1982 to fiscal year 1983. What was the chain of events that caused the Administration to propose moving ICST to GSA? What is the justification for reducing the ICST budget so sharply?

Answer. During the fiscal year 1983 budget planning process NBS was required to undergo a 12 percent reduction in its budget request. ICST's ADP activities were identified as lower in priority, one of the reasons being that these ADP activities are not a part of NBS' basic mission under the NBS Organic Act.

On October 21, 1981, Deputy Secretary Joseph R. Wright, in testimony before the House Government Operations Committee, requested a reduction in ICST's budget from $12 million in fiscal year 1981 to $10 million in fiscal year 1982. At that time, the Administration was considering various transfer options. Under the continuing resolution, funding for ICST was kept at the $12 million level. In January of 1982, the Administration proposed to Congress the transfer of ICST to GSA to consolidate all activities under Section 111 of the Federal Property and Administrative Services Act of 1949 within GSA. This consolidation would improve management efficiency and result in cost savings. The Administration requested $7.1 million to fund ICST's activities within GSA for fiscal year 1983.

Question. ICST has a research function. What is the evidence that GSA would be a good environment for conducting research? If the move took place, would ICST still be able to participate in national and international standards setting activities the way NBS scientific personnel do now so effectively in many fields?

The legislation submitted to the Congress by the Administration would transfer ICST's functions to GSA. This would include transfer of all its responsibilities under Section 111. ICST's primary responsibility is to provide Federal agencies with consultation services and to develop recommendations for uniform Federal ADP standards. It is also authorized to undertake research in support of these activities. However, most of ICST's activities have been in standards-writing and consulting. ICST has done applied engineering in direct support of standards development, but has not engaged in long-term basic research in computer science. In view of this emphasis, the environment for conducting reearch should not be a major consideration in the planned transfer. With respect to national and international standards setting activities, we know of no reason why ICST could not continue to contribute as effectively within GSA as it did within NBS.

Question. What impacts have NBS ADP standards development efforts had on the development of worldwide protocol standards? What impacts have NBS ADP standards development efforts had on the development of national or industry-wide standards?

Answer. ICST staff have worked on committees of the International Organization for Standardization, the Consultative Committee on International Telephone and Telegraph, and the American National Standards Institute. Through this work, ICST has contributed to the standards development process by developing technical specifications and testing protocol implementations. In particular, ICST had developed an initial set of network protocol standards that are consistent with a model, or framework, for such standards that was adopted by the International Organization for Standardization. ICST has worked to achieve international consensus on these protocol standards by working with users, computer manufacturers in the U.S. and Europe, the European Computer Manufacturers Association, and Government organizations in Canada, U.K., France, and Germany, as well as with the standards development groups.

Because users need these standards to interconnect terminals, computers, and networks, large industrial users have supported these standards development efforts. For example, the Network Users Association, an organization of large corporate users of ADP, has actively supported ICST's efforts. Manufacturers, also, would like to have standard specifications in order to provide better service to users and to avoid the expense of developing unique network implementations for individual users.

ICST has made the initial set of protocols available to manufacturers and other organizations for implementation and cooperative testing. The timing of these standards has been critically important. Five years ago, the standards would have been premature because data communications technology was still in its early stages. But five years from now, network standards may be too late because many organizations will have committed themselves to implementing unique products.

In other areas also, ICST has taken the lead in voluntary standards development that serves both the Federal and private sectors. The development of the data encryption standard to protect computer data through the use of computer cryptography technology is one example. Recognizing Federal needs for data security, ICST developed and issued the data encryption standard for Federal Government use in 1977. It has since been adopted by the American National Standards Institute as a voluntary industry standard, and is being used by the banking community to protect financial data. The development of computer programming language standards is an example of voluntary industry development efforts which ICST has actively supported and encouraged over the years with particular emphasis on meeting user needs.

Question. The Administration has proposed eliminating Federal support for the metals processing program, and fiscal year 1982 initiative. What are the likely impacts if NBS funding is terminated in fiscal year 1983?

Answer. NBS would carry out its initially proposed program in two of the three areas, rapid solidification and alloy coatings, to the extent and at a rate determined by the availability of other agency or private sector support. There are currently no plans for work to be carried out in the area of dual phase steels.

Question. What evidence does NBS have that the private sector or other Federal agencies will pick up this program if NBS funding is terminated?

Answer. Although there are few firm commitments at this time, we expect the Department of Defense and industrial research associates from the American Society for Metals, aerospace industry, and other industries to contribute to this program in fiscal year 1983. Furthermore, scientific input will be provided by visiting professors and graduate students from the university community.

Question. How will the competence program funds be distributed among the National Measurement Lab (NML), the National Engineering Lab (NEL), and the ICST in fiscal year 1982 and fiscal year 1983, assuming that ICST remains in NBS?

Answer. The fiscal year 1982 competence program funds were distributed by considering proposals from NML, NEL, and ICST, and judging them according to certain criteria: (1) there match to the NBS mission; (2) their potential for long-range public or economic benefit; (3) the opportunity to advance scientific knowledge; (4) their contribution to NBS institutional health; and (5) the probability of success. Previously funded competence projects were reviewed to determine priorities for continued support based on their progress towards established goals and alternative funding possibilities. In fiscal year 1983, the priorities for continued support will be determined using the same criteria as in fiscal year 1982 and previous years.

Question. Are competence funds raised from contract research arrangements with other agencies?

Answer. No, the competence funds are not obtained through other agency contracts. The funds for the competence projects are provided entirely by direct Congressional appropriation.

Question. Are competence funds spent in areas supported primarily by contracts with other agencies?

Answer. The competence program funds 28 projects. All are new activities at NBS that are selected because of their match to the NBS mission, their opportunity to advance scientific knowledge, their contribution to the NBS institutional health, and their potential for long-range public or economic benefit. Their ability to attract other agency support is not a prime consideration in the selection of competence projects. Nevertheless, because of the nature of the work done at NBS, it is anticipated that the competence projects will eventually result in increased services to industry, the public, and other agencies.

Question. What are the overhead costs (communications, supplies and materials, equipment facilities, basic support services, etc.) estimated to be for fiscal year 1982? Fiscal year 1983?

Answer. Bureau overhead costs, including general administration, maintenance activities, and utility expenses are estimated to be $41.5 million or 21.4 percent of the total NBS program in fiscal year 1982, and $40.2 million or 22.4 percent fiscal year 1983. Total overhead costs are being reduced in fiscal year 1983 by more than $1.3 million.

Question. How much of these costs will come from direct appropriation for each of the four basic activities: Measurement research, engineering measurements, computer science, and central technical support? (assuming the ICST remains in NBS)

Answer. For fiscal year 1982, it is estimated that 60 percent of total NBS overhead costs will come from STRS appropriations and the remainder from reimbursable funding. The fiscal year 1983 distribution is expected to be approximately the same as fiscal year 1982. The share of Bureau overhead costs borne by the four NBS activities included in the STRS appropriation is as follows:

[In millions of dollars]

	Fiscal year—	
	1982	1983
Measurement research	12.5	11.9
Engineering measurements	7.6	7.6
Computer science	2.1	1.8
Central technical support	2.7	2.8

Question. The testimony of Ambler, of Walters, and of Dresselhaus discuss inadequacies and obsolescence in NBS equipment and instrumentation. In what fields are the deficiencies most pressing?

Answer. Particularly dependent on the availability of state-of-the-art scientific equipment are ongoing programs in materials, electronics, automation, the 28 competence projects, and those programs associated with measurement services and the development of Standards Reference Materials. The greatest needs are principally for laboratory automated data processing equipment and major equipment acquisitions, i.e., equipment costing more than $250 thousand.

Question. How long will it take to overcome these inadequacies at the rate proposed for fiscal year 1983, and would NBS ever "catch up" in all fields with investments at these rates?

Answer. The effects of inflation on equipment modernization has been recognized for several years. In response, the equipment base has been increased over the last few years in order to offset the effects of inflation and to maintain the purchasing power of the working capital fund. In fiscal year 1981, the general equipment base was $7.1 million; in fiscal year 1982, the base is $8.5 million; and in fiscal year 1983, NBS is requesting $9.3 million in direct appropriations. In addition, general equipment needs for programs included in budget initiatives have been satisfied over the last 3 years and NBS has been appropriated funds to purchase a new central computer facility. Including all of these items, and in addition, special purpose or nondepreciable equipment, the total equipment expenditure, expressed as a percentage of the total NBS budget including other agency income, was 12.3 percent in fiscal year 1982. In fiscal year 1983, assuming the same level of other agency funding as in 1982, the figure will be 9.8 percent. With this fundng, NBS will be able to continue to provide required services in fiscal year 1983.

Although the highest priority equipment needs have been addressed, there are still areas where efficiency and quality could be improved through equipment modernization. These needs can be addressed by continued realistic inflation adjustments to the equipment base, and by accommodating special equipment needs in conjunction with programmatic initiatives.

Question. What are the normal equipment and instrumentation replacement rates for similar laboratories in the private sector?

Answer. As part of an assessment of its equipment needs, NBS contacted several major corporations that have active R&D efforts. These corporations, one each in the computer, chemical, electronic instrument, communications, and semiconductor industries, indicated that their equipment expenditures averaged 12 percent of their R&D budget. This figure is supported by those NAS/NRC Evaluation panel members and Visiting Committee members who have knowledge of equipment expenditures in the private sectors.

Question. Testimony from Blankenship suggests a need for legislation to clarify the Bureau's lead responsibility in measurement. Does NBS see a need for such legislation?

Answer. No, NBS does not see a need for new legislation to clarify the Bureau's lead responsibility in measurements. The NBS Organic Act defines the NBS role in this area and provides a charter with sufficient scope and flexibility for NBS to carry out its mission.

Question. His testimony contained an analysis suggesting that the Visiting Committee membership comes from a "rather narrow, if distinguished, scientific and institutional base." If this analysis is correct, what could be done to broaden this base?

Answer. The suggestion that the NBS Visiting Committee membership comes from a "rather narrow . . . scientific and institutional base" is not correct. Consistent with their function and NBS' mission, the Committee membership represents the range of physical science and engineering disciplines from both the industrial and academic technical communities. As a group, the membership is characterized by senior scientists, technical managers, and policy makers at the level of presidents and vice presidents of industrial firms and by scientists and engineers at levels from professors to presidents of universities. The industrial firms are a variety of large and small companies with product lines in, for example, electronics, aerospace systems, materials, and chemicals. The diversity of the Visiting Committee is further supplemented by that of the individual NAS/NRC Evaluation Panels for the centers and laboratories, which also draw their members from industry and academia.

Question. In fiscal year 1981, approximately 35 percent of the NBS support came from other agencis and in fiscal year 1982 about 31 percent comes from other agencies. What is the appropriate balance of activities between those funded by other agencies and those funded by direct appropriations? What policies are used to set the balance?

Answer. Other agency or contract work is taken on only if it is congruent with the Bureau mission and meets one of the eight criteria described in Dr. Ambler's testimony. NBS considers that other agency funding at the level of 30 to 50 percent of the total budget represents a healthy balance between activities funded by other agencies and those funded by direct appropriations.

A healthy balance between contract research and research supported by direct appropriations is essential to the vitality of the technical programs at NBS. Other agency contact provides a window to changing technology, user needs, and technical developments in science and engineering. Other agency support enables NBS to reach its goals faster than would be possible without it, and can be essential when timeliness of response is a major consideration. Other agency work also facilitates the application of fundamental NBS developments to national problems.

Question. The NBS Fire Research Center and the FEMA Fire Administration have made extensive investments in research over the past five to seven years. If the Fire Administration is terminated, what actions will NBS take to help state and local governments and the private sector make use of the knowledge gained from Federal investments over the year in fire research?

Answer. NBS does not depend on the Fire Administration, which is a funding and administration organization, as a means to deliver the output of the NBS fire research programs. NBS hs direct input to and excellent relations with the technical standards bodies, code writers, industrial firms, and state and local fire officials with responsibilities for fire related codes and standards.

Question. In 1981 the NAS Evaluation Panels were critical of the NBS calibration services to industry. An NBS internal study reportedly was critical of the calibration of NBS' own instrumentation. Are these criticisms correct? What actions have been taken or are planned to correct them?

Answer. The criticism concerning calibration services centered primarily on NBS' support of the Office of Weights and Measures (OWM) and the adequacy of their service to industry, states, and consumers in general. There was an internal study of the status of all calibration services, but it is not true that this study was critical of the calibration of NBS' own instrumentation. There have been no cases of deficiencies of this type that have been brought to our attention, either through internal reports or external feedback.

NBS recognizes the changes in the national measurement system that have made it more difficult for OWM to respond to its constituency, and is attempting to improve the situation. The long-range plan (1982–1986) of OWM was revised in December 1981 to reflect our increased awareness of measurement problems in the weights and measures community. OWM has been transferred to the Office of Product Standards Policy in the Office of the Director, NBS. A "Measurement Needs Study" was undertaken under the auspices of the NBS Planning Office. The study is not yet complete, but its goal is to "identify and assess the needs at the state level for accurate and uniform physical or chemical measurements which derive from Government laws and regulations."

In fiscal year 1982 NBS increased OWM's budget by $120 thousand to provide for expanded operations. These additional resources will provide for needed technical training for laboratory metrologists, the development of laboratory auditing procedures, and the operation of regional measurement assurance programs. Some of these resources will be directed to applying Bureau research on fluid measurement to the needs of the states. In fluid measurements, especially of the more precious petroleum products, there is a need for a precise, faster, and larger testing system than that traditionally used.

In fiscal year 1983, another $300 thousand will be added to OWM's budget. $150 thousand will support the establishment and conduct of a National Type Evaluation program. The other $150 thousand increase will go to the National Conference on Weights and Measures as a grant to be used for the development and maintenance of a technical training program for field officials. NBS anticipates that recognized, effective educational institutions will develop this program and serve as the delivery mechanisms as well.

Question. NTIS took over operation of the Smithsonian Science Information Exchange (SSIE) in October 1981. Will NTIS provide this service in Fiscal Year 1983 with periodic updates to maintain a current file of Federally funded research projects? (If yes) Wat steps will NTIS take to insure a complete listing of Federally funded projects? What steps will NTIS take to insure a broad listing of non-Federally funded projects?

Answer. NTIS is in the process of assuming responsibility for those old SSIE functions related to maintenance and updating of the research-in-progress data base. This data base currently includes records describing about 300,000 federally funded research projects in progress. About 100,000 records are added each year (of which about one-third are for new research and about two-thirds for continuing projects). During Fiscal Year 1982 and continuing through Fiscal Year 1983, monthly updates of this data base will be made available by lease to the major online vendor systems. Therefore, both the public and private sector can access this current research information through one of these systems or by obtaining the data base on magnetic tape. The Office of Science and Technology Policy (OSTP) is working closely with NTIS during this transition period. NTIS, OSTP, a number of R&D agencies, and OMB are discussing what should be NTIS' role in fulfilling SSIE's functions. OSTP is also considering convening an ad hoc task force of representatives of the appropriate source agencies, OMB, and NTIS to develop, cooperatively, an efficient, responsive, and useful research projects data base system. While NTIS is maintaining a central index of ongoing Federally funded research projects, there are no plans to maintain and index summaries of non-Federally funded projects.

Question. The testimony stated that the Department of Commerce has a study underway on the feasibility of contracting out some or all of the functions of NTIS. When will this study be completed? When will the Department have recommendations for the Congress on how the information services should be provided in the future?

Answer. The feasibility of contracting out some or all of the functions of NTIS is under review by the Department. This review should be completed and recommendations made by this time next year. The Department will keep the Congress informed.

Question. Will all NTIS activities, including the Technology transfer and the Foreign Technology Acquisition programs, be funded from the Technical Information Clearinghouse Fund in the future? If not, why not?

Answer. Beginning with the start of Fiscal Year 1985, all activities of NTIS will be self-supporting. The majority of NTIS' activities will be supported from the sale of NTIS' products and services. Some activities, including the Patent Licensing program and the Dissemination of Patent Information subprogram (part of the Technology Transfer program), will be supported by cost reimbursable arrangements with other Federal Government entities. The Foreign Technology Acquisition subprogram as currently organized will be supported from income resulting from revenue from the products and services acquired from foreign sources and from NTIS created products and services such as Foreign Technology Alert business opportunities identification announcements; bibliographies of foreign reports available on specialized topics; a biweekly newsletter, "Foreign Technology;" and repackaged translations. Assuming legislation pending before the Congress to establish the Technical Information Clearinghouse Fund is enacted into law, all monies collected by NTIS will be placed in the Fund and all costs of NTIS activities will be paid from it.

Question. What measures should be used to assess the performance of the Patent Licensing Program? What measures should be used to assess the performance of the Foreign Techology Program? What is the performance of the programs in terms of these measures?

PATENT LICENSING PROGRAM

Answer. The basic performance measure for the Patent Licensing Program is the number of licenses granted.

LICENSES GRANTED

Fiscal years:	
1978	2
1979	8
1980	10
1981	20
1982 (estimate)	30

All licenses negotiated and issued by NTIS on behalf of its client agencies are royalty bearing. Although the number of licenses is not an exact measure of utilization, licensees' payments to NTIS and submissions of annual progress reports demonstrate serious consideration and intent to commercialize licensed inventions. Another measure of performance is the commitment by licensees for additional R&D and new plant. These commitments now aggregate more than $100 million. This result has been achieved by Government funding of approximately $500,000 annually involving two professionals actually engaged in selecting, evaluating, promoting and licensing inventions.

FOREIGN TECHNOLOGY ACQUISITION SUBPROGRAM

NTIS has set the following five activities as a framework for qualifying and quantifying the performance of the Foreign Technology Acquisition Subprogram: (1) Determination of use needs; (2) Identification of sources of information to fulfill those needs; (3) Negotiation of bilateral agreements to make that information available in the U.S; (4) Translation to English of certain material acquired; and, (5) Dissemination of this information to U.S. industry.

During the first Fiscal Year of program operations the following accomplishments were logged:

(1) To determine user needs NTIS accomplished four different studies involving NTIS customers, trade and industry associations, and a large sample of small, medium and large private enterprises. These studies show what technologies are of interest to U.S. industry in which countries and illustrate industry interest in and support of this program.

(2) Intensive efforts were undertaken in the U.K., the Netherlands, Sweden, Federal Republic of Germany, France, and Japan which identified the most appropriate strategies to follow in an ongoing effort to identify information sources. Similar ac-

tivities were begun in South Africa, Israel, Australia, India, Brazil, People's Republic of China, and Canada.

(3) Some 40 bilateral agreements were negotiated with organizations in the countries noted above and including Finland, Denmark, Norway, Switzerland, and various European Economic Community entities. Many of these agreements cover all of the cooperating governments' scientific and technical agencies. Agreements with certain U.S. Government agencies also resulted, in a flow to NTIS of information gathered on an exchange basis which had not been previously submitted for public dissemination. They resulted in an input averaging 700 documents a month.

(4) Full-text English translations were initiated on 70 publications, and 198 English summaries were prepared for foreign language reports. These were from 10 languages: Danish, Dutch, Finnish, French, German, Italian, Norwegian, Portuguese, Spanish, and Swedish.

(5) Because of the leadtime involved to disseminate this information, the first meaningful figures for sales of the items acquired are for the first quarter of Fiscal Year 1982. Sales for October, November, and December 1981 were $62,000. This income is expected to rise steadily as the number of items input increases and an ongoing promotion of them is initiated.

Senator SCHMITT. Thank you, Doctor. Now if we could move on to Dr. Walters. Dr. Walters is dean, Weiss School of Natural Sciences in Houston, Tex., and he is chairman of the National Bureau of Standards Statutory Visiting Committee.

STATEMENT OF DR. G. KING WALTERS, DEAN, WEISS SCHOOL OF NATURAL SCIENCES, RICE UNIVERSITY, AND CHAIRMAN, NATIONAL BUREAU OF STANDARDS STATUTORY VISITING COMMITTEE

Mr. WALTERS. As you know, the Visiting Committee is required by law to visit the National Bureau of Standards at least once each year and to report to the Secretary of Commerce on its operations. In my remarks today I will attempt to underscore some of the views of the Visiting Committee made in my written testimony and to place them in perspective relative to the Bureau's organizational structure and responsibilities.

As you know, NBS serves as the prime generator, custodian, and disseminator of basic standards of physical measurement in this country. It has a mandate under the Organic Act to provide industry with uniform and accurate measurements and methods and to assist industry in solving measurement-related problems.

Meeting these broad responsibilities requires an organization on the one hand firmly rooted in basic scientific and engineering research for improved methods of measurement and, on the other hand, that identifies and addresses in a timely manner specific industrial problems, impediments to technical and economic growth where NBS has appropriate expertise.

In my brief remarks today I will view NBS in very simple terms as being comprised of a comprehensive array of core measurement research programs upon which is superimposed a set of more specifically focused programs, each addressing a particular measurement problem in importance to the advance of U.S. industry.

Obviously the edifice I have described can be viable only so far as the core research programs are vigorous and productive and inspire confidence in the technical community. However, the focus of the programs is often those of more immediate importance to the industry. The NBS Visiting Committee believes an appropriate balance of core and focus programs is essential if NBS is to meet its obligations.

We have concerns about both components and I would like first to say a few words about the core program. Historically NBS has enjoyed a position of preeminence with an enviable record of accomplishment in basic measurement research and has always been able to attract the very best young scientists and engineers to its employ. We can still be proud of NBS research today, but it is spread thin, with marginally adequate resources in the view of the Visiting Committee and with diminished attractiveness in the eyes of young professionals seeking employment.

I believe this situation is the result of a steady erosion of core programs in recent years brought about by the combined pressures of forced economies and demands for short-term output. This problem has been of particular concern to the Visiting Committee for some time. It has been mitigated somewhat in recent years by the competence building program, which has been highly successful in moving the Bureau to the fore front in several important new research areas and at the same time has attracted outstanding people to the Bureau.

The Visiting Committee is very concerned that this rebuilding program has been eliminated in the President's fiscal year 1983 budget, and we urge that the funds for competence building be restored.

I would like now to discuss briefly the proposed cuts in two of the focus programs—metals processing and automated manufacturing. The President's budget would terminate the metals processing program at the end of its first year. It has $3 million in fiscal year 1982, but nothing recommended for fiscal year 1983.

I believe this is a particularly exciting program, both from core and focus research viewpoints. The prospect of new kinds of materials, with greatly improved properties that might be achieved through rapid solidification and surface modification is both scientifically and technologically exciting. The NBS program in this area spans the generation of basic scientific information, data and measurement techniques and is recognized as one of the best goal-oriented research programs in the world. The Visiting Committee urges its continuation.

I will turn now to the proposed reduction in automated manufacturing. This program strikes the Visiting Committee as both well chosen and likely to generate economic benefits totaling many times the Government's modest investment. It in no way encroaches upon or substitutes for industry's direct responsibility and in fact is endorsed emphatically by the industry's concern. We hope funds for this program will be restored.

Finally, I note the House Science and Technology Committee has authorized additional fiscal year 1983 appropriations but has also imposed floors in several areas which are nearly $7 million higher than the administration's budget request. If additional appropriations are not granted, the floors will have the unfortunate effect of creating additional damage to NBS core programs if NBS must again reprogram to meet those floors. It is particularly important, therefore, for Congress to synchronize the intent of the authorizing legislation with the appropriations bill.

Mr. Chairman, other areas of concern to the Visiting Committee are documented in my written testimony. I will not try to discuss those now. I want to thank you for inviting me to express the views of the Visiting Committee. Thank you.

[The statement follows:]

STATEMENT OF G. KING WALTERS, DEAN, WEISS SCHOOL OF NATURAL SCIENCES, HOUSTON, TEX., CHAIRMAN, NATIONAL BUREAU OF STANDARDS STATUTORY VISITING COMMITTEE

Mr. Chairman and Members of the Committee: I appear before you today as the current Chairman of the National Bureau of Standards Statutory Visiting Committee to present the visiting Committee views on NBS. As you know, the Visiting Committee is required by law to report annually to the Secertary of Commerce on the operations of the Bureau. In arriving at its findings and recommendations, the Visiting Committee meets twice a year and receives input from the network of NAS/NRC evaluation panels chaired by Dr. Mildred S. Dresselhaus, (Director, Center for Materials Science and Engineering, Massachusetts Institute of Technology). These panels examine the work of the National Measurement and Engineering Laboratories and the Institute for Computer Sciences and Technology and prepare detailed reports of their observations and recommendations for use by NBS management.

Let me begin by reporting that the Visiting Committee believes that the scientific and engineering work of the Bureau is of high quality and relevance to the needs of the Nation, and that its management is excellent with close ties to the Department of Commerce leadership. In fact, Secretary Baldrige has recently directed that Dr. Ambler report directly to him. This upgrading reflects the enhanced stature and responsibility of the Bureau within the Department of Commerce. The Bureau management, while recognizing the unique long-term mission of NBS, has been able to link its skills and its potential to the urgent near term economic strategies of the Department.

In referring to the potential of NBS, the Committee is mindful of the Bureau's dependence on three kinds of resources: financial, human, and technical equipment. As to the first of these, the Committee understands the reasons for the President's restrictive budget policies. However, the Committee believes that the austere budget proposed by the Administration not only will force curtailment of recent initiatives important to industrial measurements and standards, but also will further compromise the ability of the Bureau to sustain its core research and measurement program.

By way of background, it is important to note that the steady erosion of core programs has been a continuing issue of special concern to the Visiting Committee over recent years. In particular, the extensive reprogramming undertaken in fiscal year 1979 and 1980, necessary in order to meet higher priority demands within tight budgetary restraints, and more recent mandated reductions-in-force have certainly weakened the underpinnings of the Bureau's principal mission as the prime generator, custodian and disseminator of basic standards.

Turning now to specifics of the NBS budget picture, the third fiscal year 1982 Continuing Resolution includes, as you know, increases for NBS as follows: metals processing ($3.0M), automated manufacturing ($1.5M), and competence, ($1.0M). These items have been discussed with your Committee in much detail over the last few years. In the President's fiscal year 1983 budget, the support for these programs is proposed to be severely cut or eliminated. The Visiting Committee understands the financial pressure that the Federal Government is under, but still believes that these programs should receive continued support. This feeling is also held by the House Science and Technology Committee who authorized additional fiscal year 1983 appropriations and also imposed floors which are nearly $7 million higher than the budget request. If additional appropriations are not granted, the floors will have the unfortunate effect of creating yet additional damage to NBS research programs if NBS must reprogram again to meet these floors. It is important therefore, for Congress to synchronize the intent of the authorizing legislation with the appropriation bill.

I would like first to discuss the proposed termination of the metals processing program at the end of this, its first, year. This program, on the one hand, comprises very exciting and basic research into properties of exotic new kinds of materials, and at the same time addresses two issues of national concern and of special interest to this Committee. First is the prospect of a quantum jump in the competitive position of U.S. industry in the world economy, and second, the possibility of lessening the U.S. vulnerability to strategic metals import disruptions. The program seeks specific technological breakthroughs in metals processing in the areas of rapid solidification, alloy coatings, dual phase steels, and the necessary phase diagrams for alloy development and process control.

The NBS metals processing program includes the generation of basic scientific information data, and measurement techniques—thus augmenting the core research program—and also the developement of a comprehensive computerized data base for alloy design for use by Government and industry. The NBS program is recognized as being among the best goal oriented research programs is the world. Industry's view of the importance of the data base component of the program is evidenced by their $4 million commitment through the American Society for Metals.

NBS leadership is providing the basis for the kind of cooperative, basic research program which is much needed in the U.S. today. Strong support by the private sector is demonstrated by their financial commitment. Any retrenchment in the Government's support of this program would give further evidence to industry that cooperative programs do not work. The NBS Visiting Committee strongly urges this Committee's support for the continuation of this essential program.

I will go back briefly to the other fiscal year 1982 increases proposed for reduction in fiscal year 1983. Automated manufacturing and competence funding are both items that have been extensively discussed with this Committee over the past several years. It is essential that the progress recently made in these areas not be lost. The Visiting Committee urges that you continue funding of these programs at their present fiscal year 1982 levels.

With respect ot the proposed reduction in automated manufacturing, the Visiting Committee has looked closely at the programs at the Bureau that relate most closely to industrial needs. The programs strike us as both well-chosen and likely to generate economic benefits totaling many times the Government's modest investment. They in no way encroach upon nor substitute for industry's direct responsibilities, and they are endorsed emphatically by the industries concerned.

Considering the level of NBS funds involved together with the foreseeable economic benefits, these programs carry a very high leveraging effect. But, if they are to count, the continued support of the Department, the Office of Management and Budget (OMB), and Congress is necessary.

I mentioned a second kind of resource needed for NBS to realize its potential—people. Human resources, as you know, account for the excellence of a science-based organization. In past years this factor did not receive the recognition it should have, but a correction was instituted in 1979 with the support of OMB, the Department, and the Congress. Through an agreed-upon phasing plan, competence-building funds were provided to NBS as a strategy of investment in human assets and although the step-funding appears modest on the scale of current budgets, the results have amply fulfilled expectations. At a time when forced reductions in personnel have bled NBS of large numbers of workers, the competence-building program has had markedly positive results. The Visiting Committee is particularly enthusiastic about this program and urges that you support a continuation of this investment in the 1983 budget.

Of further concern to us in the area of human resources is the effect of reduced personnel ceilings on the Bureau. I have attached to my testimony a graph of NBS staff ceilings since 1973. As you can see from the graph, the staff ceiling remained relatively constant through fiscal year 1980. However, beginning in fiscal year 1981, NBS started going through precipitous reductions in its ceiling which are planned to continue into fiscal year 1984—a reduction of 21 percent. The recent forced reduction in employment at the Bureau has not enhanced its productivity or effectiveness, while it has proven costly to morale and the continuity of research. The Visiting Committee unanimously believes that another round of forced economies in fiscal years 1982-1984 would have crippling results and prove counterproductive. Obviously, the National Bureau of Standards cannot continue to maintain its reputation as a center of excellence in an atmosphere which threatens not only its vitality but also its viability. The Visiting Committee urges this Committee to support the lifting of the NBS personnel ceiling.

The third area of support I mentioned was that of technical equipment support. In research, effectiveness depends significantly on the quality of the tools which scientists and engineers employ for measurement and analysis. If NBS has first-rate scientists who must rely on obsolete tools, we are going to get much less for our R. & D. investment than we should. In turn, this slows the speed with which new information can be handed off to industry, and the gap between the U.S. and its competitors remains unacceptably wide. NBS is accumulating obsolescence in its equipment at a steady rate, and its replacement capacity is barely one-half that of the normal replacement rate of industrial R. & D. laboratories. Even though tight budget constraints might suggest a deferral of equipment funding, the Committee is compelled to alert you to the downstream penalties that must be taken into account.

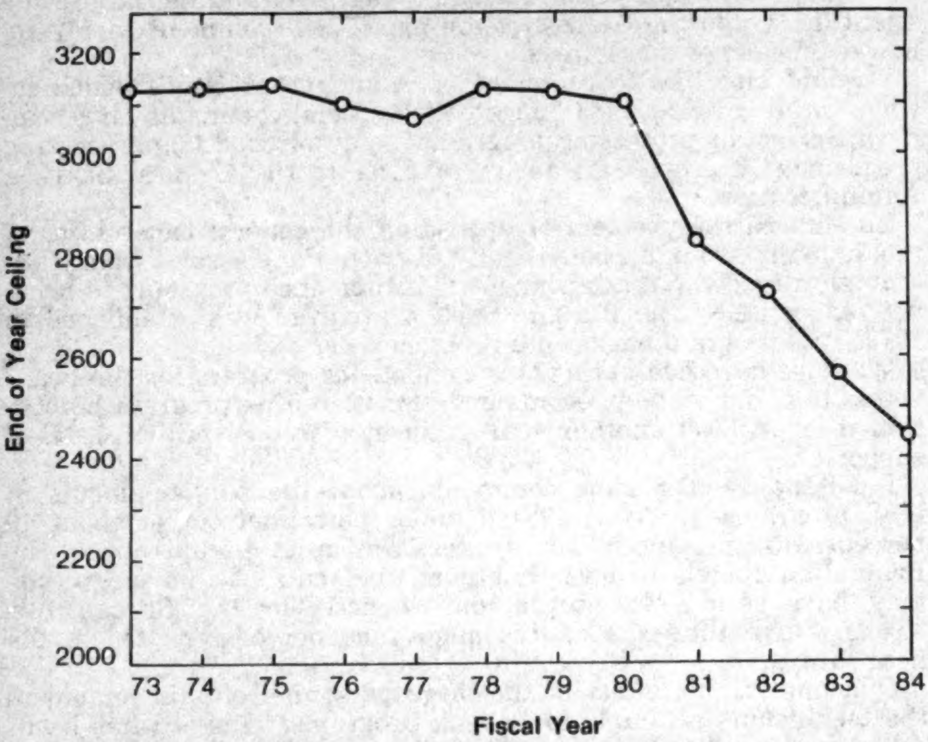
An essential equipment need of NBS is a replacement computer. NBS has been engaged in an extensive study and planning process to improve its computing capability, and funds have been appropriated to begin acquisition. The interim computer replacement that was delivered on February 10, 1982 will help provide the needed computational support through 1983. We agree with the Administration that it is extremely important that NBS be supported in its plan to acquire a replacement computer as per its present budget request. The replacement computer will be instrumental in allowing NBS scientists to use the computational sciences in support of its basic mission.

The Visiting Committee believes that NBS should be viewed as an important national resource for which there is a continuing role. This resource should then be funded accordingly—it should not lose ground to salary hikes, pay cap increases, and inflation. Since NBS is a laboratory based research organization, the costs of operations are tied directly to the technical-professional staff. Each professional requires a certain amount of support to be the most productive. This support comes in a number of ways, including: salary equipment, technicians, secretaries, general laboratory support, administrative support, travel, and many other forms—all of which can be specified in detail. On the average, for a large research laboratory, this level of support changes with various factors such as inflation, level of sophistication of equipment necessary, and others. This average support index is an important indicator of the technical health of NBS and should be monitored.

Another item that is of concern to the Visting Committee is the steady erosion of the NBS budget through the Federal pay raise process. Over the past few years, a pattern has developed in which Administration-approved pay raises are passed along to the employees without providing for the concomitant adjustment in the NBS budget. From fiscal year 1980 through fiscal year 1982, this has resulted in the equivalent of a $5.9 million programmatic decrease in the NBS budget. Obviously, this further steady erosion of the NBS budget should not be allowed to continue. We urge that the Committee anticipate to the extent possible and authorize the full funding of all pay raises.

Finally, I will address the question of the appropriate balance of efforts between Measurement Research and Standards and Engineering Research and Standards. In terms of total levels of funding, the National Measurement Laboratory (NML) and the National Engineering Laboratory (NEL) are essentially equal as indicated by the small difference in total staff levels—less than three percent. However, there is a difference between NML and NEL in the relative ratios of other agency funding to direct funding. Other agency funding contributes a larger portion to the total funding of NEL than it does of NML. This is due to a difference in the nature of the programs in the two laboratories. The Engineering Laboratory programs, by and large, are focused on more immediate shorter range problems. Other agency funding both increases the total NBS effort for these programs and facilitates the application of the research to the problems at which the programs are ultimately aimed. However, in the Measurement Laboratory, activities frequently are longer term where it is necessary to have stable direct funding over an extended period with less dependence on other agency funding. Throughout NML and NEL, in both the shorter and longer range activities, there is a broad base of core science, technology, and measurement capabilities. Together these two laboratories address a comprehensive range of important and appropriate measurement problems— the Visiting Committee is comfortable with the present balance.

Mr. Chairman, I want to express my appreciation to you for inviting me to present the views of the NBS Visiting Committee. I will be pleased to answer questions.



NBS End of Year Employment, 1973 - 1984

Senator SCHMITT. Thank you, Doctor. Now we will turn to the statement of Dr. Dresselhaus, Chairperson of the National Academy of Sciences Evaluation Panels for the National Bureau of Standards. Doctor?

STATEMENT OF DR. MILDRED S. DRESSELHAUS, CHAIRMAN, EVALUATION PANELS FOR THE NATIONAL BUREAU OF STANDARDS, NATIONAL ACADEMY OF SCIENCES, AND DIRECTOR, CENTER FOR MATERIALS SCIENCE, AND ENGINEERING, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Dr. DRESSELHAUS. Thank you for inviting me to appear here today to discuss my views on the technical activities of the Bureau. I speak here as Chairman of the Evaluation Panels of the Bureau. I testified before this subcommittee just about 2 years ago and I am very pleased to have been invited back to update my earlier remarks.

Since 1959 the National Bureau of Standards has invited the National Academy of Sciences to provide an annual external evaluation of the technical functions and operations of the Bureau. In my written statement I went into a great deal of detail about how we operate. To save time I will skip over all of that and wait for the question period if further information is needed.

Within the past few years the steering committee has taken on a new approach, asking the Evaluation Panels to focus on several special issues. These include the competence program 3 years ago, the effect of personnel cuts on NBS programs in the present year, the equipment needs of the Bureau 1 year ago, and the large-scale scientific computing needs 2 years ago. I will comment in my remarks on each of these areas.

I would also like to comment on some recent issues which involve the fiscal year 1983 budget, with special comments on the innovative metals processing program, the automated manufacturing program, and proposed transfer of ICST to the General Services Administration.

To address the problem of upgrading the general capabilities of the human resource pool, the Evaluation Panels some years ago strongly urged the establishment of competence programs to bring new expertise to the Bureau. Such a program was established in 1979. This program has been a great success.

We have been evaluating this competence program for the last 3 years. It is our strong recommendation that this program be continued for at least another year at an increased $1 million level of support.

I will now make some comments about the personnel cuts in NBS programs. In April 1981 a major personnel cut of about 10 percent was announced. This process was quite disruptive and the Evaluation Panels believe that personnel cuts of this magnitude may have serious long-term consequences for the Bureau. We strongly urge that cuts of this magnitude not be repeated in the near future.

One undesirable effect of the large personnel cuts is related to the technicians available to Bureau programs. This is what I was asked to comment about specifically.

When the number of people on a program is cut it is only natural that the senior staff be retained and the junior staff, including technicians, be reduced. This results in senior members of the staff acting as their own technicians. This high-priced technical service increases the cost of individual projects, leading to a reduction in efficiency and effectiveness of the overall program.

In my written testimony I went into considerable detail about equipment needs at the Bureau. We have evaluated the equipment needs of the Bureau in great depth during 1981 and the bottom line of our analysis is that the expenditures at the Bureau for general-purpose equipment are about at the 7-percent level.

We think this is too small to carry out the NBS program effectively or to remain a viable national standards laboratory over the long term. We think this figure should be at least 10 percent, which would be more in line with comparable research activities elsewhere.

Two years ago we made an in-depth study of the computational needs of the Bureau. We are distressed with the slowness in the acquisition of the new central computer. The Panels have addressed the continuing needs for scientific computing capabilities. We are dismayed that the antiquated central computer purchased in 1965 has been allowed to service the Bureau for this length of time.

Right now, starting in February 1982, an interim computer is being installed. This is a far cry from the needs of the Bureau. It is imperative that attention be given to the long-term computer requirements. This need is being addressed to some extent by the interim computer but we must remember that adequate computational capabilities are a long-term need and the Bureau must keep current with the developments in technology in this field.

I would like now to make a comment or two on the fiscal year budget for 1983 which the Evaluation Panels found to be very disappointing. I have already commented on the reductions in the competence program. I commented on the equipment acquisition program and the computer replacement.

It is expected that some programs would have to be terminated in the lifetime of any organization and the loss of funds and the termination of programs such as in recycled materials and environmental measurements were expected. These programs have run their course.

However, it is regrettable that two new programs were terminated—programs that we think are very vital for the future of this country: In metals processing and automated manufacturing. In both of these programs the Bureau has special expertise. We are distressed that these programs were cut in the present budget.

I would like to comment on these somewhat further. In 1980, when I testified last, I expressed strong support for the initiative in innovative metals processing. This program has taken off to a good start. The staff at the Bureau has particular expertise in this class of phenomena and the Bureau has a special role to play. In the areas of metals in general the United States is losing out radically to competition from abroad, particularly from Japan.

The Japanese have mounted an excellent program in research in their Institute for Iron and Steel at Tohoku University. It is very important that we match these kinds of developments. I hope in the discussion we can talk more about the kinds of programs being mounted abroad and the need for doing similar things in this country.

Another area where Japan leads the United States is in the application of automation to the manufacturing industries. The U.S. is becoming alarmingly dependent upon foreign-made machine tools. U.S. industry is having increasing difficulty meeting the competition from abroad.

The program that was expounded and being developed at the Bureau is a very important step in keeping American industry competitive. We strongly recommend that this program be continued for a period of perhaps 3 to 5 years so that it can be nurtured into an effective program and then supported by industry. We strongly recommend funding at the present $3 million level.

The Institute for Computer Sciences and Technology deserves special comment. I will not have time to say much about this beyond what is in my written statement. Perhaps this is a subject we can talk about in the discussion period. As you know, the ICST engages in activities to develop, issue, and maintain standards and guidelines for the acquisition and use of computer technology by Federal agencies. The budget level is currently about $12 million.

It has been proposed to transfer this organization to the General Services Administration. There is no NBS base money for ICST in the budget for fiscal year 1983. Furthermore, it is planned to continue ICST at a level of only $7 million, a decrease of $5 million. This is a serious cut to the viability of ICST.

I would like to make a few general comments that are not included in my written statement, but which I think will be important issues to address in the discussion period. I have commented above on the needs for expansion or program restoration in 5 areas—the competence program, funding of general purpose equipment, funding of a viable central computer facility and restoration of the innovative metals processing program and automated manufacturing.

I understand that these are lean years. Expansion may not be possible in all areas. However, attention must be given to the maintenance of strength of the core program in metrology and standards and to the stability of research programs in general. It is very costly to initiate new programs. Once they are started they must be nurtured for a few years—perhaps 3 to 5 years—until they become viable.

Finally I would like to comment on the issue of flexibility of management. I understand my time is up.

Senator **Schmitt**. Please proceed. You were about to conclude, I believe.

Dr. **Dresselhaus**. Just one or two comments. If there are serious budget constraints to be imposed, and this is what we are talking about in the present budget, then flexibility must be given to local management on: (1) How program cuts are to be made, (2) how personnel cuts are to be made, (3) how decisions are to be made on funding priorities and on the timing and acquisition of instruments and facilities.

Micromanagement in hard times is counterproductive. The NBS gets advice from many sources—the Evaluation Panels at the Center and Laboratory levels, the Statutory Visiting Committee and outside evaluation groups on larger policy matters. We hope that these groups, together with the NBS management themselves, can come up with some formula to meet the budgetary cuts in a way that preserves vitality in the overall Bureau program.

With this I conclude my testimony.

[The statement follows:]

STATEMENT OF DR. MILDRED S. DRESSELHAUS, CHAIRMAN, EVALUATION PANELS FOR THE NATIONAL BUREAU OF STANDARDS

INTRODUCTION

I thank you for inviting me to appear here today to discuss my views on the technical activities of the National Bureau of Standards (NBS). I am here in my capacity as Chairman of the Evaluation Panels for the National Bureau of Standards. I previously testified before the Subcommittee on March 12, 1980, and I am pleased to be able to update my earlier remarks. I speak as an academic research scientist and as a representative of about 200 members of the various Evaluation Panels. Let me provide some background on the Evaluation Panels.

Since 1959, the National Bureau of Standards has invited the National Academy of Sciences to provide an annual, external evaluation of the technical functions and operations of NBS. The evaluation program is supported by a contract between the National Academy of Sciences and NBS. Panel members are selected by the Academy from among the leaders in various fields of science and engineering in industry, government, and universities. The term of a Panel member is usually 3 years and never more than 6 years. The success of the project depends largely on the selection of capable people who have the necessary expertise to cover all the activities of NBS. Panel members are reimbursed for travel expenses, but they receive no honoraria. Nevertheless, we have no trouble in persuading people of high caliber to serve on the Panels. This attests to the high importance that these people place on the programs and services of NBS. Over the years, more than 1000 different people have served on the Evaluation Panels. I might mention, with some pride, that a former Panel member, Arthur Schawlow, won a Nobel prize in physics last year; and he is not the first Nobel prize winner to serve on these Panels.

Among the general questions addressed by the Panels are the following:

1. Do research plans address critical technical issues within the scope of the mission of the NBS and its Centers?
2. Is the planning adequate for the near term and for the long term?
3. Is the work appropriate and effective in reaching the objectives of the programs?
4. Is the research work itself at the state of the art?
5. Are the technical approaches and methodologies appropriate?
6. Are the staff skills and expertise adequate for the conduct of the work?
7. Are the available equipment and facilities adequate for the conduct of the work?
8. Is the dissemination of technical results to the scientifc community, industry, and the general public satisfactory?

Guidance and general oversight to the Panels are provided by a six-member Steering Committee, which I chair. The Committee determines general guidelines for the Panel reviews and special issues for each year. The Steering Committee also reviews the written reports of all Panels before they are submitted to the Academy for final approval and publication. There are 3 general Panels for the major operating units of NBS and currently 17 Subpanels for specific program areas. The Panel for the National Measurement Laboratory has Subpanels for Nondestructive Evaluation, Standard Reference Data, Recycled Materials, Measurement Services, Absolute Physical Quantities, Laboratory Astrophysics, Radiation Research, Chemical Physics, Analytical Chemistry, and Materials Science. The Panel for the National Engineering Laboratory has Subpanels for Applied Mathematics, Scientific Computing, Electronics and Electrical Engineering, Manufacturing Engineering, Building Technology, Fire Research, and Chemical Engineering. The Panel for the Institute for Computer Sciences and Technology has only nine members and does not need a system of Subpanels.

The written reports of the Panels are delivered to the Director of NBS and to other organizations that have requested them, such as the Department of Commerce, the Office of Management and Budget, the General Accounting Office, the Congressional Research Service, and the staff of your Committee.

The structure of the Evaluation Panels is modified each year to reflect hanging NBS programs. Since I last testified, we have dropped three Panels, and we will probably drop two more this year. These Panels were for Consumer Product Technology, Environmental Measurements, Energy Programs, Recycled Materials, and the Institute for Computer Sciences and Technology. Although the NBS program in consumer products technology was mandated, it was not of high technical content and, perhaps, did not make the best use of the high-caliber technical staff of NBS. Funds for the environmental measurements work were withdrawn from the NBS base and transferred to the Environmental Protection Agency (EPA). With EPA in complete control of the money, there was little the Panel could do to influence these programs. The Panel for Energy Programs came to the end of its usefulness as energy programs at NBS received less emphasis. With a cut in the fiscal year 1983 budget of $3 million for recycled materials, it does not appear that the continuation of a Panel for that group is warranted. And last, if the Institute for Computer Sciences and Technology is removed from the Bureau, the corresponding Panel cannot continue as an Evaluation Panel for NBS.

ISSUES OF CONCERN TO THE EVALUATION PANELS

In the invitation I received to appear here, you expressed particualar interest in:

1. The adequacy of the NBS technical base—expecially technicians and instrumentation that enable NBS to maintain its preeminent position, and
2. Any existing or emerging major problem areas within the operations of the Bureau.

I am most happy to discuss these areas and other areas of interest to the Evaluation Panels.

Within the past couple of years, the Steering Committee has asked the Evaluation Panels to focus on several special issues: the Competence Program, the Effect of Personnel Cuts on NBS Programs, the Equipment Needs of NBS, and the NBS Scientific Computing Needs. I will comment on each of these areas. In addition, the Evaluation Panels have brought to the attention of the Steering Committee several other areas of concern: a chemical engineering program for NBS, calibration service activities of NBS, and other agency funding. I will comment on each of these areas. Finally, I will have some remarks on two recent items; the fiscal year 1983 budget for NBS, with special comments on the innovative metals processing program, the automated manufacturing program, and the proposed transfer of the Bureau's Institute for Computer Sciences and Technology to the General Services Administration.

COMPETENCE PROGRAM

The Competence Program, which I address next, responds to the question of the adequacy of the technical base of NBS. The Evaluation Panels for the last decade have expressed concern over the ability of the NBS staff to apply the latest technological developments to the mission of NBS in metrology and standards. In this last decade, we have witnessed dramatic developments in computer hardware and software, automation, new materials, and sensors. With a constant staff size and a very limited influx of new personnel with new expertise and ideas, it has not been possible for NBS to introduce new technologies and ideas at an adequate rate to meet the needs of the national program in metrology and standards. This limitation on human resources has been further aggravated by inadequate updating of facilities and equipment, thereby inhibiting the full utilization of available human resources.

To address the problem of upgrading the general capabilities of the human resource pool, the Evaluation Panels strongly urged the establishment of a Competence Program to bring new expertise into the NBS program. Such a Program was established in 1979 with planned funding increments of $2 million per year to provide a comprehensive, discretionary, in-house research program, which the Panels believe is essential for a strong and healthy NBS that can respond swiftly to emerging national needs.

This year, we asked the Panels to review these Competence Programs in depth, and the written reports of the Panels are just now being received. It is obvious to the Panels that the competence money had been well spent. The projects were chosen with great care, and they have been beautifully executed.

The initial competence projects have now matured into productive programs with useful outputs. For example, in the National Measurement Laboratory the surface science project, which began in fiscal year 1979, has resulted in many exciting publications with major new advances in that field providing baseline information of importance to heterogeneous catalysis, the prevention of corrosion, and reaction kinetics. The picosecond laser chemistry project, which began in fiscal year 1980, is another example of a highly successful competence project, providing unique and fundamental understanding of chemical kinetics and new reaction pathways that can be induced by photon activation into excited states. In the National Engineering Laboratory, the competence project on soot formation has resulted in a new technique for measuring submicron particles, and another competence project resulted in an extension of the photo deep-level transient spectroscopy technique of detecting charge carriers in gallium-arsenide, a semiconductor material predicted to be of great importance in the near future.

From the observations of the Evaluation Panels, it is safe to say that we can expect similar successes among the more recent competence projects.

Unfortunately, the future of the competence Program is in jeopardy. The fiscal year 1983 budget indicates that incremental increases for the Competence Program have come to an end, and the budget in fact indicates a cut of $1 million in this core program. The Evaluation Panels strongly feel this to be an unwise move at the present time. As originally envisaged, a competence project was to be funded for perhaps 5 years, during which time the project could be successfully developed and incorporated into the overall NBS program as other funding sources could be secured. The original competence money could then be used to fund new competence projects. The Evaluation Panels feel that the proper balance of the Competence Program in comprehensive in-house research programs to provide the scientific and technological underpinnings for the overall R&D programs at NBS should be about 15 percent of the total program. At present, about half of this goal has been achieved. The Evaluation Panels strongly recommend that the Competence Program be continued for at least another year with an increment of $2 million to this program to achieve a minimal level of advance in the general technology base, compatible with the current rate of technological advances and the overall needs of NBS programs.

EFFECT OF PERSONNEL CUTS ON NBS PROGRAMS

In April 1981, a major NBS personnel cut of about 10 percent was announced. This process was quite disruptive, and the Evaluation Panels believe that personnel cuts of this magnitude may have serious long-term consequences for NBS.

The Bureau is widely recognized as an organization with outstanding accomplishments. Maintaining and enhancing the associated level of scientific and engineering excellence requires a steady infusion of new talent and abilities. Unfortunately, in competitive fields such as electrical engineering and computer science, industrial salaries offered to new PhD's are $5,000 to $10,000 higher than those available at NBS. The Panels believe that the inability of the Bureau to offer competitive starting salaries in such fields has made it difficult to attract adequate staff in these fields and will have serious consequences on the eventual ability of the Bureau to continue to meet many of its challenges. This problem has been greatly exacerbated by the recent personnel cuts. Therefore, the Panels recommended that more resident predoctoral and postdoctoral fellowships at NBS be encouraged. Special agreements are needed to combine graduate programs at universities with work-study programs at the Bureau.

Another undesirable effect of the personnel cut is related to the technicians available to the Bureau programs. When the number of people on a project is cut, it is only natural that the senior staff be retained and the junior staff, including technicians, be reduced. This results in senior members of the staff acting as their own technicians. This high-priced technical service increases the cost of individual projects, leading to a reduction in the efficiency and effectiveness of the overall program.

EQUIPMENT NEEDS OF NBS

In fiscal year 1981, we asked the Evaluation Panels as a special issue of concern to assess the adequacy of the general-purpose equipment for carrying out the measurements and data analysis required for the research programs at NBS. The individual Panel reports from that year contain many detailed recommendations on the subject, with numerous instances of work that cannot be executed adequately or at all because of a lack of up-to-date equipment. Metrology in particular stands to gain by recent advances in instrumentation yielding greater sensitivity, accuracy, and speed. In many cases, such advances have been made possible by rapid developments of the computer industry in microprocessors and minicomputers.

On the basis of their assessment, the Evaluation Panels found that the NBS level of expenditures for general-purpose equipment, which is about 7 percent or less, is too small to carry out the MBS programs effectively, or to remain a viable national standards laboratory over the long term. We think this figure should be at least 10 percent, which is more in line with the 10 to 12 percent level common in comparable research activities in industry.

Also, the Evaluation Panels note that the equipment and facilities at NBS are sometimes inadequate to attract and to hold quality staff in rapidly advancing areas. In many specific instances, the efficiency and productivity of the NBS staff could be improved markedly by replacing aging, but workable, instrumentation in areas of rapidly changing technology with newer, more accurate, faster, automated instruments. The Evaluation Panels strongly recommend that high priority be given to providing the staff with equipment adequate to carry out the research programs that are undertaken.

General-purpose equipment purchases at NBS are funded through the Working Capital Fund, with the NBS Centers paying back the Fund over the lifetime of the equipment. In order for this system to work properly, the Fund should receive yearly increments to offset inflation and to reflect the trend toward increased relative instrumentation costs as metrology becomes increasingly automated. I do not find that provision had been made for this in the fiscal year 1983 budget.

NBS SCIENTIFIC COMPUTING NEEDS

The slowness in the acquisition of the new central computer is distressing to the Evaluation Panels and to Bureau personnel. The Panels have addressed the continuing issue of NBS scientific computing capabilities and needs as an area of special concern; they are dismayed that the Bureau still relies on the antiquated central computer, purchased in 1965, which is now obsolete, inadequate to handle computational needs, and expensive to operate and service. Clearly, progress in science and engineering demands access to modern central computer facilities that remain current with rapidly evolving computer technology. For a national research laboratory to be without modern computing capabilities is nothing short of a national embarrassment.

The aptly named interim computer installed at NBS in February 1982 is a welcome upgrade of the computing facilities. However, it is far short of meeting the long-term computing requirements of the Bureau.

Thus, the Panels have strongly recommended that a powerful, modern central computer facility be established with a charter that mandates an annual evaluation of computer technology and subsequent replacement with the next generation computer when NBS needs and computer technology improvements so dictate. Such a "keep-current" mandate is essential for the technical strength and efficiency of the NBS program. High-level and ongoing attention should be focused on this evolution, and plans should be made from the start to provide these expected updates.

It is not clear whether the new central computer will be purchased or leased. However, it is the opinion of the Evaluation Panels that the operating staff should be comprised of NBS personnel. There is need for additional technical support staff for assistance with programming and automation of data acquisition and data processing.

The Evaluation Panels are impressed with the growing use of minicomputers and microcomputers in controlling experiments and in data acquisition and analysis. Such small computers are essential to the scientists and engineers at NBS and are separate in function from the central computer. The need for more minicomputers and microcomputers could be addressed through an expended capital equipment budget as discussed elsewhere. However, these should not be isolated machines. They should be connected by a high-speed computer network such that any individual scientist can start his experiment or analysis and let the network decide such issues as where to perform the computations or where data should be stored or retrieved. The new NBS-NET is a good first-generation computer network, but it will need expansion and upgrading in the near future.

The Panels have recommended that central text and graphics facilities should be made readily available to the NBS staff. The text facilities should allow efficient preparation of scientific text, which is often the end product of NBS research and development. The importance of an advanced, interactive graphics facility cannot be overemphasized. Recently, the preparation of phase-alloy diagrams at NBS has been computerized. As additional data are received, these diagrams can now be updated easily without the need for tedious hand drafting. These techniques should be applied to many other projects at NBS to improve the efficiency of personnel.

GENERAL REMARKS ON THE FISCAL YEAR 1983 BUDGET

The fiscal year 1983 budget for NBS is very disappointing. I have already commented on the reductions in the Competence Program and computer replacement. Of course, many programs at NBS have a limited lifetime, and so the loss of funds for the programs in recycled materials and environmental measurements is not of great concern. These programs have run their course.

It is, however, particularly regrettable that STRS funding has been reduced for recent programs in metals processing and automated manufacturing. The need for these programs is great, and it is strongly recommended that funding for these programs be restored. It is doubtful that they can continue with the same vigor under other-agency and industrial funding, as discussed below.

INNOVATIVE METALS PROCESSING

In 1980, I expressed strong support for the initiative in innovative metals processing. That program was subsequently funded and is off to a good start. I note with concern that base funding for the program has been removed from the fiscal year 1983 budget.

New techniques in the rapid solidification of metals can produce remarkable improvements in strength and resistance to corrosion and oxidation. New atomic arrangements can be achieved, leading to enhanced solubility of one metal in another and the development of special alloy phases for particular mechanical and magnetic applications or service environments. During solidification small instabilities at the moving solid-liquid interface can greatly influence the amount of alloy segregation produced. Alloy phase diagrams are needed to achieve an understanding of these phenomena so as to gain control of the special properties that can be achieved with this new class of materials.

The staff at NBS has particular expertise in this class of phenomena and a special role to play in support of industrial exploitation of these developments. This is one area where NBS involvement can have a significant impact in improving the competitive position of the U.S. metals industry in world economy. The Japanese have a leadership position in research developments in this area through the excellent and large-scale basic research program in their Iron and Steel Research Institute at Tohoku University. Largely through research developments by this outstanding laboratory, Japanese industry has gained a commanding position in many areas of the international metals industry.

The metallurgy program at the Bureau is recognized for its general excellence and particular experience in the field of rapid solidification. Industry has given recognition to the importance of the NBS program by providing $4 million funding to this effort through the American Society for Metals. The Evaluation Panels have emphasized the importance of the development of cooperative basic research programs in support of industry-wide programs, such as the metals processing program for the metals industry. The launching and nurturing of this cooperative program over a period of between 3 and 5 years is necessary to achieve an effective operational program that can then be fully supported by the participating industries. It is important the United States learn how to launch and develop industry-wide cooperative programs, an activity that the Japanese have already demonstrated to be effective in achieving national leadership goals in the semiconductor and metals industries.

AUTOMATED MANUFACTURING

It is well known that Japan leads the United States in the application of automation to the manufacturing industries. In fact, the United States is becoming alarmingly dependent on foreign-made machine tools, whether automated or not. U.S. industry is having increasing difficulty in meeting the competition from abroad.

No doubt U.S. industries will develop their own programs in automated manufacturing, and this is now in progress. However, the developments in each company will tend to be proprietary, so that without cooperation, it would be impossible to mix machine components from different manufacturers. This would produce a fragmentation of the manufacturing industry into noncompatible sectors.

NBS is in a unique position to provide standards in automated manufacturing, which the private sector cannot provide for itself, including interface standards, quality assurance standards, and calibrated measurement techniques for shapes and sizes of parts as they are being produced under computer control. It is the opinion of the Evaluation Panels that the original decision by NBS to contribute to the national program on automated manufacturing was well justified. The program that is being developed exploits the unique capabilities of the Bureau and provides high leverage to the automation programs being developed by individual companies. To be effective, these programs must be nurtured for 3 to 5 years to become effective and viable. Programs in automated manufacturing are of great importance to the national economy, and we therefore urge continued support for this NBS initiative in automated manufacturing.

THE INSTITUTE FOR COMPUTER SCIENCES AND TECHNOLOGY

The changes affecting the Institute for Computer Sciences and Technology deserve special comment.

The Institute for Computer Sciences and Techology (ICST) engages in activities to develop, issue, and maintain standards and guidelines for the acquisition and use of computer technology by Federal agencies. The current budget level is about $12 million. However, it has been proposed that ICST be transferred to the General Services Administration. Therefore, there is no NBS-base money for ICST in the fiscal year 1983 budget. Furthermore, it is planned to continue ICST at a level of only $7 million—a decrease of $5 million.

The resources provided to the ICST have never been sufficient to fulfill adequately the mission mandated by the Brooks Act, which established ICST. Nevertheless, ICST has been a leader in several areas and has issued many Federal Information Processing Standards (FIPS). Some of these FIPS are essentially the same as standards adopted by the American National Standards Institute (ANSI). However, without the leadership and active participation of ICST in the consensus process of ANSI, these standards might never have been developed.

It is not within the purview of the Evaluation Panels to comment on a change in the organizational structure that would move ICST from the Bureau to the General Services Administration. We assess the technical programs. However, there is one aspect of the move that will have a drastic effect on the technical programs—the $5 million decrease in the budget. This is about 40 percent of the budget. This will undoubtedly result in the loss of key technical personnel. The FIPS program, which accounts for 90 percent of the budget, will be most affected.

A CHEMICAL ENGINEERING PROGRAM FOR NBS

A particularly encouraging development since I last testified for the NBS, is the organization of a Center for Chemical Engineering. The Panels have enthusiastically supported this effort. This is not a totally new effort at NBS. However, the new organizational structure will facilitate the redirection and focusing of projects on the most significant problems of the chemical process industries. It is estimated that the chemical process industries consume 80 percent of all energy used by U.S. manufacturing industries. A small program at NBS with well-chosen projects can have significant impact on this segment of U.S. industry.

CALIBRATION SERVICE ACTIVITIES OF NBS

The Bureau provides many services related to measurement techniques, calibrations, and standardization. The calibration programs are selected to address industry-wide needs and public concerns.

Calibrations and measurement standardization are required for interindustry transactions and international trade. However, they are not usually profitable enough for any one company to undertake, and it is seldom that voluntary, intercompany efforts are practical without government support. The NBS and other national laboratories play an essential research role. The Bureau, through calibration services and measurement assurance programs, makes the results available to industry and the public. The Bureau is the only organization that can ensure that the various calibrations are consistent with the basic standards of measurement.

In fiscal year 1981, the Evaluation Panels were sharply critical of the calibration services of NBS. The Panels noted with deep regret that some important calibration services were being dropped because of budget cuts, and those that remained suffered from a lack of automated, up-to-date equipment. Subsequently, the bureau did an in-depth study of its calibration services that led to many improvements.

The calibration activities of NBS are important. The Bureau is the legal source of metrological standards. It is essential, and sometimes reuired, that measurements in industry be traceable to NBS standards through periodic calibrations. It is a service that only NBS can provide.

OTHER-AGENCY FUNDING

A significant portion of NBS funds, approximately $60 million, comes from other government agencies. A reasonable amount of such externally funded work is desirable in the opinion of the Evaluation Panels, as a means of assuring that Bureau activities remain relevant to other-agency needs. However, there are possible instabilities of such funding. The Panels have recommended that sufficiently long-term agreements generally be sought with agencies sponsoring research at NBS to ensure funding commitments over reasonable time scales for progress, to forestall precipitous termination of partially completed projects, and to provide minimal funds to develop the scientific and technical underpinnings necessary to carry out the other-agency research projects effectively.

The Panels find the overall ratio of other-agency to STRS funding within NBS to be about right, but in some NBS Centers, there is too little STRS funding in relation to other-agency funding. When the other-agency funds amount to more than 50 percent of a Center's budget, the Panels find that there is a great danger that the Center will not be in complete control of its priorities.

I am happy to see in the fiscal year 1983 budget that $3.5 million for the Center for Fire Research is to be converted from other-agency to STRS funds. This change is greatly welcomed by the Panel for the Center for Fire Research.

CONCLUDING REMARKS

The primary mission of NBS is to provide a uniform and accurate basis for measurements in the physical, chemical, materials, and engineering sciences. In this respect, NBS plays a unique and essential role in the U.S. economy. I call on this Subcommittee to provide NBS with the resources necessary to carry out this mission.

In addition, the Bureau provides important services to other Federal agencies and is given additional assignments by Congress. I call on this Subcommittee to see that NBS is given sufficient resources to provide these services and to accept these additional responsibilities.

SUPPLEMENTARY STATEMENT OF DR. MILDRED S. DRESSELHAUS

Our society is deeply committed to living with high technology in industry and commerce. The Bureau has a unique role to play in generating, validating, and distributing basic standards and measurement techniques. We depend on this compilation of data, largely done by the staff of NBS, in carrying out research as well as in manufacturing and commerce.

One can give many examples of standards and standard reference data, such as: (1) a standard 4-40 screw, (2) a standard 6V battery, (3) a standard gallon measure for gasoline, (4) frequency standards accurate to 1 part in 10^{10} for television carriers, (5) an atomic frequency standard accurate to 1 part in 10^{13} for satellite-to-earth communication necessary for defense, (6) air quality standards using sensors for NO_2, H_2S, etc., (7) critical temperatures and critical fields for superconducting materials, essential for building superconducting magnets, (8) high-temperature phase diagrams, thermodynamic data and thermochemical data, needed to develop new alloy systems with desired properties in strength, corrosion resistance, etc., (9) tables of ion penetration depths, needed to make p-n junctions in semiconductors.

The systematic collection and evaluation of data requires very special skills that take a long time to develop. There is little incentive for private firms to collect data systematically. There is, however, a major public benefit for gathering data systematically that justifies the expenditure of public funds.

Research work in standards and metrology must be done by experts having a great deal of skill and experience. such people by and large are not found in universities or in industry.

Research work in standards tends to benefit the public and would be of small benefit to an individual company. The expense of setting up a laboratory, the expense of developing the personnel (human resources), the expense of carrying out the data collection activities, and the fact that the collected data would quickly become available to every other firm in the field make this type of activity unattractive to industry. The value and benefits of such information are too broad for an individual company to justify.

One of the functions of the Evaluation Panels, the Visiting Committee, and the Bureau management is to consider in great detail whether a particular program is best carried out at the Bureau, in private industry, or by another national or government laboratory (Brookhaven, Oak Ridge, Los Alamos, Naval Research Laboratory, etc.). The nation cannot remain competitive with other industrial nations without running hard to maintain its scientific and technological capabilities. The Bureau plays a vital role in maintaining these capabilities. If the budget of the Bureau is to decline, a detailed examination is needed to assess which programs or subprograms could perhaps be done by industry, by other national or government laboratories, or perhaps not done at all. At a time of contraction, flexibility of management is especially important, including flexibility in program and personnel management, as discussed below.

In my prepared testimony, I have commented on needs for program expansion or budget restoration in 5 areas:

1. Modest expansion of the Competence Program.
2. Expanded funding of general-purpose equipment.
3. Funding of a viable central computer facility.
4. Restoration of funding for the Innovative Metals Processing Program.
5. Restoration of funding for the Automated Manufacturing Program.

I understand well that there are lean years ahead. Because expansion may not be possible in all areas, attention must be given to:

1. Maintenance of strength of the core program in metrology and standards.

2. Stability of research programs—It is costly to initiate new programs, and once started they should be nurtured for 3 to 5 years to reach maturity.

3. Flexibility of Management—If there are severe budget constraints to be imposed (and the proposed budget does impose severe budgetary constraints), flexibility must be given to local management on: (1) program cuts, (2) personnel cuts, (3) priorities in funding, (4) timing in the acquisition of instruments, equipment, facilities, etc.

NBS gets advice from various sources:

1. Its own management and planning group.
2. The NRC Evaluation Panels at the Center level.
3. The NRC Evaluation Panels at the Laboratory level.
4. The Statutory Visiting Committee.
5. Outside evaluation and consultant teams.

It is these advisory groups who, on one hand, are in a position to assess the technical merits of programs, and, on the other hand, can assess the overall effectiveness to the Bureau program and the relative merits of the Bureau's priorities. Micromanagement in hard times is highly counterproductive. Flexibility and local management are necessary to achieve an effective and responsive program.

During the discussion following my testimony, I was asked to provide specific input from our Panel on the Institute for Computer Sciences and Technology on the issues raised during the discussion of ICST. I volunteered to provide such information, and this will be forthcoming before the end of March.

I thank you again Mr. Chairman for the invitation to speak to the Subcommittee on Science, Technology, and Space and to express my views on how the excellent program at NBS can be made even more effective and viable. On behalf of the NRC Evaluation Panels for NBS, I would be glad to address further issues on which you would like my input.

[The following information was subsequently received for the record:]

National Research Council,
Assembly of Mathematical and Physical Sciences,
Washington, D.C., March 26, 1982.

Senator Harrison H. Schmitt,
U.S. Senate, Committee on Commerce, Science, and Transportation, Washington, D.C.

Dear Senator Schmitt: I am sending some additional material on the Institute for Computer Sciences and Technology, as I promised when I gave my testimony at the authorization hearing for the National Bureau of Standards on March 17, 1982.

The material was prepared for me by Mr. Douglas T. Ross, Chairman of SofTech, Inc., and Chairman of the Academy's Evaluation Panel for the Institute for Computer Sciences and Technology. Because of the time constraints involved, this was the only way we could get the necessary information to you by Friday, March 26, 1982, as promised.

If you have any questions abouyt this material, please feel free to call me (617-253-6864) or Mr. Ross (617-862-5019), or leave a message, if he is unavailable, at SofTech (617-890-6900).

Sincerely yours,

Mildred S. Dresselhaus,
Chairman, Steering Committee Evaluation Panels for NBS.

The Software Technology Co.,
March 25, 1982.

Senator Harrison H. Schmitt,
U.S. Senate, Committee on Commerce, Science, and Transportation, Washington, D.C.

Dear Senator Schmitt: I welcome this opportunity to provide written testimony regarding the Institute for Computer Sciences and Technology and its role and function. Both I and the other ICST Evaluation Panel members believe strongly in the unique value of ICST to our country.

The Institute for Computer Sciences and Technology (ICST) performs a unique and valuable role for both the Government and private sectors. It is highly appropirate to remove ICST from competition with the larger programs of the National Bureau of Standards (NBS) during this time of severe budget limitations, and strengthen it so that it can stand on its own. Since 1978 ICST has had a well-structured 5-Year Plan and, although only partially funded, that plan has been working well and effectively within the limitations imposed. ICST management and staff have demonstrated they can do the needed job, which is described in full in the Appendices to this letter.

To perform its Brooks Act mandated functions of (1) Standards Program development and management, (2) Assistance to other Government Agencies, and (3) Research and Development in its field, ICST requires the resources and budget needed for a balanced program and a stable organizational environment with top management well-tuned to the special needs of ICST. These questions of resources, budget, and home for ICST must be addressed wisely and carefully because the explosive growth of computers in Government and the world economy require that the ICST functions be geared for the long pull. How best to address the ICST question will require time and study.

A RECOMMENDED INTERIM SOLUTION

In order to continue the excellent progress ICST has been making, and accelerate toward the needed levels by countering at least some of the inflation effects of the last few years, it is strongly recommended that the following steps be taken as an Interim Solution:

(1) ICST be left physically where it is at NBS so there is no disruption regarding space, contacts, and working environment, but that ICST be removed organizationally from NBS.

(2) An ad hoc Blue Ribbon Panel for the Interim Management of the ICST be selected and be empowered to advise the ICST Director in an active top-management role. In order not to require any immediate amendments to the Brooks Act at this time, this Blue Ribbon Panel should report to and advise the Office of the Secretary of Commerce, as the Secretary may delegate.

(3) ICST be granted at least five new personnel slots, with at least one at top GS level, so that new Clearing House, Education, and User Relations functions can be established and managed, and so that Other Agency work and funding can be accepted and performed well.

(4) The total budget for ICST for fiscal year 1983 be set at $15-20M, including Other Agency fuding, as it may be acquired by ICST, up to 20 percent of its total budget, and 5-10 percent for Competency Research, so that all aspects of the Brooks Act mandate are met.

(5) The ICST Director be charged to (1) update the current 5-Year Plan to reflect these changes, permitting the Blue Ribbon Panel to perform its role knowledgeably and, (2) with counsel from that Panel, from the ICST Evaluation Panel, and others, to establish goals and budgets for subsequent years. An integral part of this planning process must be support for the decision-making regarding the long-term proper home for ICST including all of its ramifications.

(6) Some provision be mde for the combined Congressional and Executive branches of Government to make use of these Interim Steps to establish a permanent home for ICST that can supply management understanding and support of its mission, and a stable budget.

The attached Appendix documents fully support this Interim Solution recommendation. Each Appendix starts with a brief summary page. Those pages are duplicated as an Attachment to this letter, for easy reference.

Since it is most unusual to recommend increased funding these days, may I call your personal attention particularly to the first few sections of Appendix A, on which the economic case rests. There is a concise and excellent summary of ICST in Appendix B, and a thumb-through of the Appendix G color-marked Evaluation Panel reports shows, that my recommended Interim Solution has, in fact, been needed for a long time. Our 1981 Evaluation Panel reports give our official assessment in depth, although the Panel has not yet had a chance to see the specific recommendations presented here.

I hope that this material will be of help to you in your deliberations. I would be pleased to submit further elaboration, if desired, either in writing or in person, informally or in a formal context at any time. I can usually be reached, day or night, at 617-862-5019, or leave a message if I also am unavailable at SofTech, 617-890-6900.

Very truly yours,

DOUGLAS T. ROSS,
Chairman, ICST Evaluation Panel.

Senator **SCHMITT**. Thank you, Doctor. I appreciate your contribution.

Now, Dr. Blankenship, if you would proceed with your testimony.

STATEMENT OF DR. L. VAUGHN BLANKENSHIP, DIRECTOR, DIVISION OF BUDGET AND PROGRAM ANALYSIS, NATIONAL SCIENCE FOUNDATION

Dr. **BLANKENSHIP**. Thank you, Mr. Chairman. I am pleased to be here this morning.

One year ago I completed a study of the National Bureau of Standards for the Subcommittee on Science, Research, and Technology of the House Committee on Science and Technology, and it was published last May as a committee print called the National

Bureau of Standards: A Review of Its Organization and Operations, 1971–80. I prepared it while on leave from NSF as a LEGIS fellow at the Congressional Research Service.

As the title suggests, the purpose of the study was to analyze the general management trends and policies of the Bureau during the decade of the 1970's in order to provide a basis for a review of the Bureau's Organic Act. The primary sources for this study were authorization hearings; appropriation hearings; several studies by GAO and the Office of Technology Assessment; reports of the evaluation panels of the National Academy of Sciences; minutes of the meetings of the Visiting Committee; and several internal studies done by the Bureau and, in one instance, a member of the Visiting Committee.

These were supplemented with interviews with a number of present and former Bureau staff members; present and former officials at OMB, the Department of Commerce, and OSTP. Needless to say, the interpretation of the information is my own and not necessarily a reflection of the views of either the National Science Foundation or the administration. My general familiarity with what has happened at the Bureau since completing this study has been very limited.

I returned to the Foundation last spring and I have not really been in touch with what has occurred at the Bureau since then. Keeping this in mind, let me briefly summarize the organizational and policy trends of the 1970's and 1980's as I presented them in the report.

During this period the Bureau was coming out of the "high science" period of the 1960's into a very different environment in the 1970's. The emphasis in the 1970's was on social programs and regulation. There was a large number of new pieces of legislation affecting the Bureau. In one short period, as I recall, there were 12 which mandated new responsibilities, usually regulatory or socially oriented activities.

There was a growth in other agency funding to a high of 43 percent in 1978. This was accompanied by a shift in support from more R. & D.-oriented agencies like DOD and NASA, to more social agencies like HUD, FEMA, and the Environmental Protection Agency. These trends were accompanied by a change in the complexion of the staff, and more concern with questions of implementation of measurements and standards.

By the early 1980's, however, it was clear that the emphasis was shifting to questions of industrial innovation and productivity. These were closer to some aspects of the Bureau's traditional role than were some of the activities of the 1970's. There are six areas of potential congressional interest that I identified in the study which I would now like to summarize briefly for your interest.

The first question was one that came up again and again in the 1970's, that of lead agency responsibility for measurement. Is there a need to clarify the Bureau's responsibilities for generic measurements? This was a frequent source of difficulty, budgetary, and organizational, during the 1970's because of overlap with measurement responsibilities of mission agencies.

If it is clarified, additional questions should be asked. How does the Bureau interact with other agencies for planning purposes and for establishing its priorities? How are other agency priorities reflected in such things as the competency program which has been discussed here this morning? Have other agencies found the Bureau responsive to their short- and long-term measurement needs?

Another area is one which I call long-term/short-term Bureau responsibilities. No issue received more attention during the 1970's than what was sometimes called the decline of competence in the Bureau. There was a general feeling that the scientific base programs had been eroded by new short-term responsibilities.

But by the beginning of the 1980's there was a feeling that the competency program—the investment in instrumentation, the upgrading of the computer, et cetera—was alleviating what many had considered to be a major problem. There was no general policy, however, on the desirable level of basic work at the Bureau, although this was discussed frequently in testimony and in many meetings of the Visiting Committee.

Nor was it apparent that there was an overall set of Bureau policies or a clear strategic plan for its basic work in measurement activities or an indication of how those basic priorities were set or how they were related to the needs of mission agencies. In the competency program and other longer term work, one had the sense that judgments were being made and an ad hoc, case-by-case basis rather than some sort of clear, overall, well-laid-out plan.

The area of discrete parts manufacturing, as has been indicated, was a new initiative developed in the early 1980's, although the Bureau had been attempting to build something in this area for some time. Again, a series of questions might be asked. How does this work relate to private industry and to research in universities?

In the area of manufacturing many of the companies engaged in discrete parts manufacture are very small. How does the Bureau's work get communicated to these small firms who don't really have the R. & D. capability of the large machine tool and other large manufacturing companies?

Similarly, how does a program in discrete parts manufacturing fit in with some larger Federal strategy, if there is one, for improving the technical base of manufacturing in the United States?

Another area touched on this morning involves computer research and automated data processing standards. The Bureau has been responsible since 1965, with the passage of the Brooks Act, for developing Federal ADP standards, for advising agencies on problems, and for conducting research on computer standards. As you are aware—and I know this committee has held hearings on it before—there was much difficulty with this program during the 1970's, much disappointment in it and its level of achievement.

In the spring of 1978, the Bureau produced a 5-year ADP standards plan for this committee which estimated a total cost at that time of $100 million. So far, the annual appropriation has been only about $11 million. If the committee decides to consider the future role of the Bureau in ADP standards, it may want to ask several questions.

Is it inherently impossible to develop in this area standards which are not anticompetitive or else outmoded by the time they are completed? Is it possible to develop standards without a strong research program? Given the nature of the labor market for computer scientists and engineers and the size of the research activities of the computer industry, is it even possible to build such a program within a reasonable budget?

Another area I examined briefly is the role of the Visiting Committee in the Bureau. As you know, it has a statutory basis: five members who report annually to the Secretary of Commerce on the efficiency of NBS's work and its equipment. During the 1970's there was some discussion by Congress and the Visiting Committee itself on the need to broaden that role to include things like planning, long-range technological forecasting, and budgeting.

It seemed to me that any real effort to broaden the role would be limited by several things. One is the statutory requirements of the Organic Act itself. Another is the rather narrow, if distinguished, base from which its members were drawn during the 1970's.

In spite of the Bureau's highly diverse programs, most of the members of the Visiting Committee came from a rather limited scientific and institutional base, career experience and background.

A final area is the question of alternative modes of support. With the exception of the Joint Institute for Laboratory Astrophysics at the University of Colorado, the fire program and the data processing program, I believe most of the work by the Bureau is conducted in-house. It may well be that in the 1980's there might be some value in thinking about changing this mix, with more extramural research or possibly another joint institute in some other area.

That concludes my summary of my statement and I will be happy to answer questions.

[The statement follows:]

STATEMENT OF DR. L. VAUGHN BLANKENSHIP, DIRECTOR, DIVISION OF BUDGET AND PROGRAM ANALYSIS, NATIONAL SCIENCE FOUNDATION

Mr. Chairman: One year ago. I completed a study of the National Bureau of Standards for the Subcommittee on Science, Research and Technology of the House Committee on Science and Technology. After undergoing the usual review by the staff of the Congressional Research Service and the Committee Staff, it was published in May, as a Committee print entitled "The National Bureau of Standards: A Review of its Organization and Operations: 1971-1980." Before I go on I wish to make clear that the views expressed in this testimony are my own and do not necessarily reflect the views of the National Science Foundation or the Administration.

The primary purpose of the study was to analyze the organization, management and general policies of the Bureau during the decade of the 1970's in order to provide a basis for a review of the Bureau's Organic Act. I prepared the report while at the Congressional Research Service on leave from the National Science Foundation as a LEGIS Fellow.

Your staff contacted me in connection with the Authorization Hearings you are holding on the Bureau and suggested that some of the findings and conclusions of the study would be of interest to you and other Committee Members in your deliberations. I am pleased to be able to respond to their interest.

I would like to cover three things in my remarks this morning. First, I will outline the general approach used in the study, mentioning the primary sources of information upon which it, and its conclusions, are based. Secondly, I would like to provide you with a summary overview of the major conclusions about trends and developments that the Bureau during the 1970's and about the directions things seemed to be moving in at the beginning of the eighties. Finally, I would like to highlight six issue areas which might be of special interest to you and other Committee members.

INFORMATION SOURCES

There were five primary sources for the study: (1) Congressional Oversight Hearings; (2) Appropriations and Authorization Hearings: (3) several studies by the General Accounting Office, the Office of Technology Assessment and the Congressional Research Service; (4) the available minutes and records of the meetings of the Visiting Committee of NBS; and (5) several internal assessments of the management, policies and programs carried out by Bureau staff and Visiting Committee Members.

These documentary sources were supplemented by an extensive series of in-depth interviews conducted by me with a number of present and former Bureau staff members, current and former officials at OMB, OSTP, and the Department of Commerce. The interviews included a former, as well as the current, Director of NBS, two former Deputy Directors of the Bureau and three former Assistant Secretaries for Science and Technology, who, at the time, had overall responsibililty for NBS within DOC.

ORGANIZATIONAL TRENDS AND KEY ISSUES OF THE 1970'S

At the end of the 1960's the Bureau was emerging from a period of emphasis on "high science," an emphasis reflecting Federal policy commitments in science and technology of the late 1950's and early 1960's. Many of the top and middle management in the Bureau had risen to their positions as part of the "high science" generation recruited in the late 1940's and 1950's.

The Federal policy concerns of the 1970's were quite different and required a different kind of outlook and response from NBS. The general policy emphasis shifted from one of "high science" and "building the scientific and technological base" of the Nation to regulation and the expansion of social programs.

The period of the 70's was an active one in terms of new legislation which directly of indirectly affected the Bureau. During the first 60 years of its existence, only four additional acts modified the original NBS Organic Act of 1901. Between 1975-79, alone, there were 12 Acts which expanded or modified the Bureau's responsibilities. These changes were accompanied by two other things: a significant shift in the sources of funding for Bureau programs and a change in the scientific complexion of the Bureau's staff.

Between 1971 and 1980, funding from direct Congressional appropriations increased by only 13 percent, in constant dollars, most of it in the last two fiscal years of the decade. The proportion of "other agency" support increased from 32 percent in fiscal year 1970 to a high of 43 percent in fiscal year 1978. This was accompanied by a shift in sources of funds from agencies like NASA and DOD to "social " agencies like HUD, the Consumer Product Safety Commission, EPA and the Federal Emergency Management Agency (FEMA).

The Bureau's staff became more diversified, in terms of its scientific complexion, as the applied programs, and emphasis, increased. The newcomers were more likely to be engineers, computer scientists, applied mathematicians, even economists and behavioral scientists rather than the "traditional" physicists and physical chemists in the Bureau's basic measurement programs. The orientation of these newcomers towards such things as planning, management, research, publications and utilization were often quite different than the orientation of those in the Institute of Basic Standards (IBS) and Institute of Materials Research (IMR).

By the beginning of the 1980's a new set of public policy concerns appeared to be emerging. These concerns, focusing on the related problems of inflation, unemployment, productivity, and the international competitiveness of American industry, appeared to be displacing the earlier emphasis on regulation and social problem solving. This new emphasis, was much closer to the Bureau's traditional role vis-a-vis industry and technological innovation than the social, problem-solving emphasis of the 70's.

The Bureau conducted its own internal assessment of programs and considered a number of alternatives for focusing them better on industrial and technological issues. New initiatives were proposed in the fiscal year 1981 budget in areas like materials research, VLSI (very large scale integrated) circuits, and automation of discrete parts manufacturing. Funding from "Other Agency" monies was expected to drop from its high of 43 percent in fiscal year 1978 to an estimated 37 percent in fiscal year 1980.

Finally, the reorganization of the Bureau in 1978 into the National Measurement Laboratory (NML). The National Engineering Laboratory (NEL) and the Institute of Computer Science and Technology (ICST) had several purposes. It was believed that it would strengthen the Bureau's ability to respond to the new, emerging opportunities in industrial technology and productivity. Secondly, it was hoped that it would tie the "Science" of the Bureau more closely to the "Applied Work" in other programs. Finally, it was intended to tighten management and relieve lower levels of the Bureau of some of the paper-work burden which had been placed on them.

AREAS OF POTENTIAL CONGRESSIONAL INTEREST

Against this overview of trends during the 1970's and early 1980's let me now highlight several important areas of potential interest to your Committee:

Lead Agency Responsibility in Measurement. Under the organic act, NBS has a generic responsibility for improving measurements and standards and for working with industry, professional and scientific groups, local government and other Federal Agencies in carrying out this responsibility. Other mission agencies of the government have a responsibility for developing and improving measurements relating to their own mission. The difficulties arise whan the Bureau's generic responsibilities overlap with the mission responsibilities of other agencies as they seemed to, for instance, in the area of environmental measurements.

In the 1970's the Office of management and Budget, at times, used the "Lead Agency" doctrine as the basis for withholding direct funding support of the Bureau's generic research areas and requiring that all funding should come from the designated lead agency. One of the consequences was that the Bureau's programs were tied to the priorities and budgetary schedules of other agencies. This limited its ability to carry out longer-term research and to meet its responsibilities to groups beyond the "Lead"agency.

Is there a need, legislatively, to clarify the Bureau's "Lead" responsibility in measurement? An internal Bureau study of the late 1970's concluded that some legislative clarification was needed as did a study by the GAO undertaken at the request of this Committee and reported in February, 1980. If this Committee should decide to pursue this question further, it may wish to review, more broadly, the relationship between NBS and other agencies. More specifically:

How does the Bureau interact with other agencies for planning purposes and for establishing research priorities?

How are other agencies' priorities reflected in such things as the "Competency" program initiated in 1978?

Have other agencies found the Bureau responsive to their short and long term measurement needs?

Long-term research and short-term responsibilities. There was probably no other single issue which received as much time and attention from NBS management and from the Visiting Committee during the 1970's than what might be called "The decline of competence at NBS." There was a feeling that the new, applied measurement programs developed in response to legislation in the 1970's were inadequately based on good science; that resources and people were being pulled away from basic measurement research" to work on these applied, other-agency funded programs; that bright, young scientists were no longer coming to the Bureau in as large number as before. There was much debate about what the "right" amount of basic research was for a place like NBS.

By the beginning of the 1980's, such things as the new "competency" program, the ten-year program of investment in research equipment, and the decision to upgrade NBS computing facilities appeared to have alleviated some of these concerns, though many of the reports by the National Academy's Evaluation Panels were still filled with doubts about the overall sufficiency of resources being devoted to long-term, more generic research. Given the central importance of these questions, the Committee may want to examine the question of long-term research and shorter-term responsibilities.

At the time of the completion of my study, there was no general NBS policy regarding the rationale for a desirable level of "basic" research. Each program element appeared to be evaluated more or less independently without any apparent systematic attention to the issue of longer-term work or how it related to short-term responsibilities. How, for example, does the 15 percent expenditures for "basic" research reported by the Bureau in the survey of Federal funding relate to the "competency" program? How does longer-term work, such as that in the "competency" program relate to potential needs of mission agencies? Can the Bureau provide an overall set of policies and a clear, strategic plan for its "basic research" activities, including its "competency" program? What are the specific strategic plans for using this "competency" funding in areas of highest future leverage and how is the Bureau making these assessments beyond a kind of case-by-case, *ad hoc* series of judgments? What are the significant future demands likely to be on NBS and how is this longer-term work being organized to anticipate and respond to them?

Discrete parts manufacturing and industrial productivity. Throughout the 1970's, the Bureau attempted to develop a substantial thrust in the area of automation and manufacturing. Given encouragement during congressional consideration of the fiscal year 1981 budget, NBS proceeded to begin renovation of its machine shop, including installation of an integrated machine tool and industrial robot system to be used as a "test bed" for a considerable expansion of its work in manufacturing. This area was judged to be one of the most promising in terms of industrial innovation and productivity.

How large should such a program be and how does it relate to work in private industry and universities? Where would such a program fit in any larger Federal strategy for stimulating improvement in the technical base for discrete parts manufacturing in the United States?

At the time of its initiation, the Visiting Committee expressed concern over the potential impact of this thrust on other programs in NBS. How will it relate to other programs? Should it grow solely through shifting in-house staff and resources or should it be combined with some sort of university grants program or research center? How would it link up with the thousands of small, discrete parts manufacturers in the United States?

Computer research and ADP standards. In the Spring of 1978, the Bureau provided this Committee with a Five Year Product Plan for a Federal-Wide ADP Standards Program. A subsequent Bureau estimate placed the total cost of this effort at $100 million, with yearly increments of between $20-$22 million. The first installment on this program was an appropriation of $11 million in fiscal year 1979.

After the passage of the Brooks Act in 1965, the Bureau was assigned responsibilities for (1) research on computer technology and software and on public sector applications of this technology; (2) advising other Federal agencies on computer technology and applications; and (3) developing ADP standards for the Federal government. The Bureau fell short of these expectations and, following critical reports by both GAO and the House Committee on Government Operations in the mid 1970's, the focus of NBS work narrowed.

As the Bureau entered the decade of the 1980's, its work in ADP standards appeared to be at a critical junction. Its work on standards had been proposed for level funding, at least through fiscal year 1981, at $11 million—considerably below the estimated $20 million annual amount required to meet its five year plan. Most resources were devoted to producing standards with few left to carry out its other responsibilities under the Brooks Act. One of its recent standards had been challenged in court by several major computer manufacturers as outdated, anti-competitive, and favoring foreign manufacturers. A report by the President's Federal ADP Reorganization Project Standards Study Team had recommended removing the Institute for Computer Science and Technology (ICST) from the Bureau and placing it directly under the Secretary of Commerce.

If the Committee decides to consider the future role of NBS in ADP standards, it may wish to ask several questions:

Is it inherently impossible to develop standards, at least in some areas, which are not anti-competitive or else outmoded by the time they are completed?

Is it possible to develop standards without a strong research program?

Given the nature of the labor market for computer scientists and engineers and the size, and research activity, of the computer and communications industries, is it even possible to build such a research program within a reasonable budget?

How will ICST keep in touch with the needs, problems, and concerns of other agencies if it no longer has the resources to undertake work for other agencies?

Does the location of the ICST within NBS inhibit its ability to work with other agencies or to take on other agency work?

Finally, what would be the implications for its future directions if it were placed directly under the Secretary of Commerce or elsewhere?

Role of the NBS visiting committee. The Visiting Committee of NBS, with five members, is provided for in the Organic Act and is directed to report annually to the Secretary of Commerce on the "efficiency" of the NBS scientific work and on the conditions of its equipment. It meets twice a year with NBS management, selected staff, and members of the Steering Committee of the NAS Evaluation Panels to hear reports from these various groups and to discuss programmatic and budgetary issues.

The minutes of its meetings and discussions as well as its official, annual letters to the Secretary suggest that its members saw themselves primarily as spokesmen for scientific quality at NBS, continually arguing for its strengthening and warning against budgetary, managerial or personnel developments which they believed threatened it.

During the decade of the 1970's, the Congress and members of the Visiting Committee itself raised many questions regarding its role and purpose at NBS. Should it have an expanded, policy-making and priority-setting role in the Bureau? Should it carry out long-range planning and technological forecasting? Should it be more involved in defending or explaining budget requests and program priorities?

At present, several factors appear to limit its ability to undertake such broader roles. The present terms of the Organic Act explicitly assign it a "visiting and reporting" role. The size of the Committee and the rather narrow scientific and institutional base from which its members have been drawn would be an additional limitation on any policy-making or long-range planning and forecasting it might do.

During the 1970's the typical member was 53 years old at the time of his appointment (only one female), possessed a PhD in Physics or Physical Chemistry, and had begun his career as an academic or industrial scientist, moving up the research career ladder into an R. & D. management position as an academic department chairman or vice-president for research in a major company with a strong R. & D. base. In light of the diversity of programs, clientele, technical areas, policy issues and institutional sectors with which the Bureau deals, this is a rather narrow, if distinguished, scientific and institutional base.

The scientific base, for example, included none from the computer, biological or social sciences and only three or four from engineering—out of a total of twenty members. Only two, possibly three, could have been said to have pursued essentially non-scientific careers. Although applied programs in such areas as manufacturing, computer standards, building and construction, environmental measures and fire were among the most visible during this period, there was little in the biographies of any members to suggest that they had any direct knowledge of, or experience with, the operational, organizational or economic issues which the Bureau itself often noted tended to dominate measurement issues in such applies areas.

If the Bureau is to be a "pure" measurement research agency, with almost exclusive emphasis on physical measures without regard to the operating, economic or psychological environment in which they are used, a Committee with such membership may be excellent. If it is to be more than this, however, or if it is to engage in priority setting or the forecasting of technological needs, this would seem to be a much too restricted membership base.

Should the Visiting Comittee go beyond its present formal responsibilities for "visiting and reporting" to broader involvement in budgeting, planning and policy-making?

In light of the wide variety of the Bureau's programs and its legislative responsibilities to many groups, is the institutional, scientific, and experiential base from which its members are drawn sufficiently broad?

If the function of the Visiting Committee were to be broadened, how would it affect relationships between the Bureau, Commerce and OMB?

Would the possible advantages from such changes outweigh the costs?

Alternative modes of supporting research. With the relatively minor exceptions of the fire research program, the ICST and the Joint Institute for Laboratory Astrophysics (JILA), NBS has managed its programs and responsibilities by building up its own staff and conducting its work in-house. The exceptions are interesting. The university grants program in fire research was inherited from the National Science Foundation. The JILA was established in the "high science" days of the early '60's as a joint NBS/University of Colorado research center on the campus of the University. Finally, the grants program in computer research was undertaken, initially, out of expediency following the tripling of the NBS appropriations for ADP standards work in fiscal year 1979.

The continued rationale for the predominant mode of operation, as opposed to one which relies much more heavily on a mix of intramural and extramural work, might need examining in the changed environment of the 1980's. Perhaps the model of JILA might be followed in other areas.

CONCLUSION

During the 1970's and into the very early 1980's, the National Bureau of Standards underwent a number of changes. Earlier emphasis were changed, new roles and expectations were added. There was continuing concern about how well the Bureau was adapting to its changed role and environment and about the short-term and long-term impact of these changes on its scientific and technical competence as an organization.

I have summarized some of these friends for your Committee, Mr. Chairman, and outlined several issues from my report which may continue to be of interest to you in the still-changing environment of the 1980's. I shall be pleased to answer any questions you may have on my summary comments.

Senator SCHMITT. Thank you very much, Doctor. Thank you all for your testimony, the details of which, of course, will be studied carefully as we look at this authorization.

Dr. Ambler, do you want to take a minute or two to make comments based upon what you have heard, or shall we just go into questions?

Dr. AMBLER. I would just as soon go into questions.

Senator SCHMITT. I think one of the issues that will concern the committee the greatest is the ICST. Dr. Ambler, could you first give us some perspective on why you believe the Institute was originally placed in the NBS?

Dr. AMBLER. The responsibilities performed by the Institute are solely those assigned to the Secretary of Commerce by the Brooks Act. The Brooks Act relates to the procurement and use of automatic data processing equipment by the Federal Government. It is limited to the Federal Government.

The Brooks Act assigned responsibilities to three officials—the Administrator of General Services for the procurement area, the Director of the Office of Management and Budget for general policy guidance, and the Secretary of Commerce for standards, consultation, and research. The Secretary delegated his responsibilities to the Bureau where they are exercised by ICST.

Now the way the program has had to operate, the focus of the Bureau's activities has been on standards writing rather than research or consultation. The funding was such that most of the work was in writing standards.

Senator SCHMITT. What do you see the effect of a transfer to GSA being relative to your interpretation of the intent of the Brooks Act?

Dr. AMBLER. Well, it would have what I think is an advantage in that it would consolidate responsibility for the Brooks Act in one place, apart from the policy direction of the OMB.

Senator SCHMITT. That looks good on paper when you draw block diagrams of responsibility, but what about the actual performance of the Institute in meeting the development of standards, for example, which has been the Bureau's principal responsibility?

Dr. AMBLER. Well, I don't know that there would be any inhibitions or difficulties for the Institute in interacting with external groups and continuing their responsibilities, as they have while they have been under the Bureau of Standards.

There is a policy recommendation also in that the request for appropriations has been reduced to rely more on the private sector standards-writing organization for assistance in this work.

Senator SCHMITT. Have not the private organizations been relying on the Institute?

Dr. AMBLER. The standards written by the Institute are called Federal Information Processing Standards and are only binding on the Federal Government.

Senator SCHMITT. But haven't they been used by the standard organizations?

Mr. KAMMER. I think it would be fair to say in most cases, sir, that the Federal Information Processing Standards adopt practices generally accepted in the private sector already and apply them to the Federal Government. It might be useful to consider that back in the mid-1960's, when the Institute was established, there was a fear that the Government practice would constrain practices in the private sector with respect to ADP.

Now I think it is clear that there is a very active private sector. The Federal Government only buys about 7 percent of the ADP equipment sold in the United States.

Senator SCHMITT. So your conclusion is there has been no substantive interaction between the Federal activity and the private sector activity with respect to setting standards?

Mr. KAMMER. Sir, I did not mean to imply that. There, at times, have been considerable concerns. The standard on interfaces between computers was a cause of considerable concern in the private sector, who felt that the standard we would promulgate would constrain their ability to sell machinery. It hasn't seemed to work out that way, but there have been times when there was concern.

Senator SCHMITT. But if we eliminated ICST, the private sector would not see much difference?

Dr. AMBLER. As far as——

Senator SCHMITT. The extending of standards. My impression from what you have said so far is that the flow of information is largely toward the Federal Government and there has been very little interaction or contribution from the Federal side into the private sector.

Dr. AMBLER. I think that is right. The private sector would not see very much effect.

Senator SCHMITT. And the fact that the staff of the ICST has been participating in industrywide standard-setting activities really would not be missed and we might as well save the travel money.

Dr. AMBLER. Well, no, I don't think I would go that far. The presence of the Federal representatives on private sector standards-writing bodies is a useful thing in many areas. In fact, there are many members of the National Bureau of Standards staff who serve in that capacity and bring their technical expertise.

But if this presence were diminished, I don't think the private sector activities would come to a screeching halt.

Senator SCHMITT. Or be significantly modified?

Dr. AMBLER. Perhaps not significantly modified. I think the Federal Government might lose the ability to influence the writing of standards where it has some interest.

Senator SCHMITT. Are its interests unique enough that it ought to be involved?

Dr. AMBLER. In the particular area of computers or generally speaking, sir?

Senator SCHMITT. No, in ADP standard setting.

Dr. AMBLER. Personally I don't think they are.

Senator SCHMITT. What about the basic research that goes with the current activities of the ICST? Is that at a significant level? What proportion of the funding goes to basic research in the area of standards?

Dr. DRESSELHAUS. There has been practically no basic research done in ICST, sir.

Senator **Schmitt**. I thought you indicated the Brooks Act mandated that research in this area would be conducted.

Dr. **Ambler**. The primary responsibility of the Secretary of Commerce under the Brooks Act is to provide Federal agencies with scientific and technological consultation and to develop recommendations for uniform Federal automatic data processing [ADP] standards. The act authorizes the Secretary of Commerce to undertake necessary research in support of these activities. It is just that the research and consultation have been practically negligible because most of the effort has been put on the standards writing.

Senator **Schmitt**. So basic research is not really necessary to writing standards. Is that what you are saying?

Dr. **Ambler**. No, I am not saying that, sir. What I am saying is that the resources available were such that we felt we should devote them all to the standards writing.

Senator **Schmitt**. And certainly at the reduced budget level proposed by the administration you would not expect GSA to conduct any basic research in spite of the act?

Dr. **Ambler**. I do not know. I cannot answer for GSA. I suppose their reputation for supporting research is somewhat less than the reputation of the Bureau for doing the same.

Senator **Schmitt**. Their reputation is somewhat less than the National Bureau of Standards?

Dr. **Ambler**. For doing research.

Senator **Schmitt**. Without qualifications.

Would any of the other members of our distinguished panel care to comment on the issue on which I just questioned Dr. Ambler?

Dr. **Dresselhaus**. Well, let me try to say a few words about this. One problem of our computer industry nationally is its diversity. The products of one manufacturer tend to be incompatible with the products of another manufacturer, so that if a consumer in the public sector or private sector—any sector—wants to put a computer system together he gets into the problem of interfacing, and it is in this area that the Bureau programs have been useful and supportive of the whole national effort.

The situation in our competitor countries—Japan, France, and so forth—is they have a much smaller number of producers and their products tend to be standardized along certain line. I think that in the future we will suffer for our lack of standardization.

The private sector makes some effort at reaching compatibility. The IEEE has certain conventions that are promulgated and can be adopted, but this is a rather slow process. There has to be willingness among the competing companies in the private sector to go along with such conventions and that has not necessarily been the case in the past.

One problem of ICST, as seen by the evaluation panels, is the funding for this program has been so small that it has not been possible for the program to have the kind of impact that ICST could have had. With the reduced funding in the 1983 budget I think the possibilities of proceeding are even more marginal.

Senator **Schmitt**. Then, Dr. Dresselhaus, you do not subscribe to the philosophy that since this is probably the major growth industry, not only in this country but in the world, the information industry, as it were, that the Federal Government does not need to have a role because the private sector will be investing its own resources?

Dr. **Dresselhaus**. I am saying the Federal Government has a role and it has not fulfilled its mission in that role as it could have.

Senator **Schmitt**. Do you think——

Dr. **Dresselhaus**. We started out in this field ahead of all of the competitors and we are slowly losing ground.

Senator **Schmitt**. Is that because of a lack of investment by the Federal Government or a lack of——

Dr. **Dresselhaus**. There are many reasons for it.

Senator **Schmitt**. A lack of investment incentives in the private sector?

Dr. **Dresselhaus**. That may be, but the fact that we do not have as good standards as we might have is another inhibition to progress in this field.

Senator **Schmitt**. So it is your conclusion that there is really no mechanism, given our basic legal structure—and I will put words in your mouth and include the antitrust system—for an industry to really do the standards-setting job necessary to provide a competitive information industry?

Dr. **Dresselhaus**. That is correct. The Japanese have MITI and we do not have anything like MITI. ICST in a sense plays one of the roles of MITI, but ICST is not anywhere as effective. We have to figure out better how to get our act together in the computer field.

To say that we will give up ICST, I do not think is the answer. Rather we should focus on making ICST more effective.

Senator **Schmitt**. Dr. Blankenship, you look as if you are about to shake your head off in agreement there.

Dr. **Blankenship**. There were a couple of points I wanted to make in response to one of your earlier questions—why this was put in the Bureau of Standards to begin with. Let me just suggest a couple of things.

First of all, it was assumed on good evidence in the early 1960's that the Federal Government would be investing billions in computer automated equipment and there was some clear need, just in terms of efficiency, to begin to try to develop some standardized purchasing procedures as well as some standards for this equipment.

Under the Brooks Act the Bureau, in my judgment, was asked to be in this business because it was perceived as one of the best places in Government with the potential technical competence to develop these standards.

The Bureau had been in work related to computers for 20 years before 1965 but it had been focused primarily on the hardware. The Brooks Act was really the first time MBS was put in the position of developing standards. The fact that the standards were supposed to be binding on other Federal agencies made their job more difficult. The standards were supposed to be enforced by OMB and GSA.

On your second question about the impact on industry, I think there is a different way to look at that. One aspect of the impact on industry, of course, is the question you have been focusing on, which is its preparation of standards.

Another aspect of the impact is that, the Federal Government is one of the major purchasers of this kind of equipment in the United States. If the Government writes its own standards, it will have a major impact on that industry. This has been precisely why the development of these standards at the Bureau has been so controversial.

There was a suit, about a year ago—I don't know whether it has been resolved—by some of the main frame manufacturers with regard to some of these output standards. So it is a very difficult area in which to develop standards. It is of enormous importance to the industry if the Federal Government writes its own standards. It will have an impact on what the main frame and peripheral equipment manufacturers can do, and that is why it is a centrally important issue.

Senator SCHMITT. If you were going to change the Brooks Act to make it clear what the role of the Bureau should be in this area, how would you change it?

Dr. BLANKENSHIP. That is a tough one.

Senator SCHMITT. All of you could present that for the record, if you have any ideas on it.

Dr. BLANKENSHIP. Let me think about that.

Senator SCHMITT. Dr. Ambler, do you know—excuse me, Dr. Walters. Did you have any comment on this?

Dr. WALTERS. I think I am in substantial agreement with Dr. Dresselhaus' statement.

Senator SCHMITT. Dr. Ambler, did you recommend or did the NBS or the Department of Commerce recommend this change to the administration?

Dr. AMBLER. That recommendation was made by DOC and OMB, Mr. Chairman.

Senator SCHMITT. Does the Institute participate in international standards-setting activity?

Dr. AMBLER. Yes, it does some. Yes, sir.

Senator SCHMITT. And do you know of any analysis by OMB on the effect of the transfer?

Dr. AMBLER. No, sir.

Senator SCHMITT. Have there been any comments of which you are aware by the non-Federal computer information industry on the proposed transfer?

Dr. AMBLER. None have been made to me, sir.

Senator SCHMITT. If you could anticipate their comments, what do you think they might be? Pro? Con? Who cares?

Dr. AMBLER. You are asking me to speculate, so my answer is right off the top of my head and very speculative. I kind of think it would be the latter—who cares?

Senator SCHMITT. In spite of what Dr. Blankenship has said, that the Federal Government is a major purchaser?

Dr. AMBLER. They are not. They purchase only about 7 percent of the total. The Federal Government is not a major purchaser. I think that it might be——

Senator SCHMITT. That 7 percent includes the Defense Department and the Energy Department?

Dr. AMBLER. Yes, I think it does—everything.

Senator **Schmitt**. That does sound a little bit low, but there is a lot of computer activity out there.

Dr. **Ambler**. Well, there sure is. I have a feeling that at the time the Brooks Act was passed, and, again, it is a feeling—I have not looked at the legislative history—but I have a feeling that at that time it looked as though the Federal Government would be the major user.

But because of the deployment of computers in banking, insurance, airline reservations and all of the service industries——

Senator **Schmitt**. But in terms of the big number crunchers, isn't the Federal Government the dominant purchaser of big computers?

Dr. **Ambler**. That is probably true.

Senator **Schmitt**. Cray?

Dr. **Ambler**. But how many Crays in the world are there?

Senator **Schmitt**. There are 3 or 4 in the State of New Mexico alone, and I will tell you when you start thinking about those big computer complexes starting to talk to each other, it gets frightening.

Dr. **Ambler**. I think you have most of the country's Cray computers in New Mexico down at Los Alamos.

Senator **Schmitt**. In Los Alamos, the Air Force Weapons Lab is installing a Cray. Sandia is working in that direction, I believe, and they will all be linked together. It will be one heck of a complex. Maybe they are setting their own standards. Maybe they do not need the Bureau.

Dr. **Ambler**. From what I know about those machines, they do pretty well and we get time on the Cray. We use the one in NCAR in Colorado occasionally and it does not seem any problem.

Senator **Schmitt**. But it seems incongruous in what is clearly an information age and what will be an information epoch in the future that the Government is contracting its activities in research on interface standards and the setting of interface standards rather than expanding, particularly as Dr. Dresselhaus has indicated, in view that most of our competitors feel somehow this is important for a central Government to do.

Dr. **Ambler**. You have given me the opportunity to comment on something Dr. Dresselhaus said, namely Japan—the Japanese competition. I think that is enormously important. I spent quite a bit of time, and many of us in the Bureau have spent a great deal of time not only looking at the kinds of things that Japan is producing but the way they go about it. It is enormously impressive and we must take our hats off to them.

If you ask me what the first, second, and third concerns should be in our high technology business, it is, first Japan, second Japan, and third Japan, because they have a system that is so competitive. Now I was just reading an article last week by the president of Hitachi, going to the standards area.

His strategy is very clear. He will make everything he makes compatible with IBM and the strategy is plain. He is going to try to take over the IBM market.

Senator **Schmitt**. Yes.

The administration seems to forget in the case of NBS, in the case of NASA's aeronautics program and in the case of some other research and technology efforts, in which I include the NBS, that the Federal Government represents the only way, as I indicated earlier, that industry can really get together and work without a legal threat coming from antitrust.

The Japanese do not have that problem. They can work together any time they want and these institutes are very good vehicles by which they do that. If we take away the aeronautics and NBS activities or significantly reduce them, haven't we put our industry at an even greater competitive disadvantage than they are already?

Dr. AMBLER. Let me try to answer that generally. I think you are asking it in the context of ADP, but I would like to answer it generally first, if I may. Generally speaking, I would agree. I think the role the Bureau of Standards plays in interacting with industry at all levels in running workshops, and in running seminars and transferring information is enormously valuable and one of the most important things we do.

Perhaps that is true in ADP standards also, but I would have to come back then to the 7-percent interest in the field and also——

Senator SCHMITT. But at the same time the Government has bought very few of the commercial aircraft that have been purchased in this country. It has had, up until this administration, the major role for coordinating research and technology in aeronautics though the role declined in the last administration.

Now there is some kind of a feeling within this adminstration that that will happen without the Government being involved in it, but I think it represents a misunderstanding of why the aeronautics R. & D. effort was established in 1914 and why it persisted to be a vital part of our research and technology community since that time.

I think in the same context, the administration does not yet understand what the NBS really contributes in science and technology besides just having responsibility for setting standards and measures.

Dr. AMBLER. I am in sympathy with what you are saying. There is debate going on on some such issues related to the Bureau of Standards that are of the kind you mention, and I am very happy to say that I have had considerable support from the Secretary of Commerce, Mr. Baldridge, in the kind of programs we have been developing.

I think in fairness there has been the conclusion, which I think is probably correct, that the Federal Government has been getting into certain kinds of demonstration projects that were going further than necessary. These were not the kinds of things you are talking about such as developing basic scientific information and data.

And I suppose the problem is that there is a little hunting going on—to decide where the line should be drawn.

Senator SCHMITT. Well, there is more than a little hunting, and I agree. I think the Government got into demonstration projects that were not only ill conceived but were in an economic context unjustifiable for the basic reason that industry had already decided not to do it. And whether you are talking about some of the major solar energy electricity projects or the synfuels business you can come up with a whole long list of where the Government was directly funding things they never should have.

Now, some of the difficulties in those industries were put there by the Government through excessive regulations of various kinds and a repressive tax code, but nevertheless, I think the conclusion is the correct one. But to draw then from that that there is no basic role for research and technology on the part of the Federal Government, particularly in the face of our antitrust custom and law, I find ludicrous. I just find that OMB and others who are espousing that theory and who use it to justify cutting these kinds of programs and those in aeronautics and those in agriculture just totally misunderstand or never understood what the Government's role in a free enterprise system is all about, and particularly in a technological free enterprise system.

I hope we can gradually convince them, but one of the problems we face, Doctor, and we have faced it with every administration, is that there are essentially no people in the highest levels of policymaking who understand science and technology to the point that they are willing to make decisions based upon it. That is the problem, and I sympathize with them. It is tough to make decisions on issues, the foundations of which you have no comprehension.

Doctor.

Dr. **Dresselhaus**. I wanted to make several comments, one about the ICST. You were asking about the impact of the proposed change on ICST. The evaluation panels are studying this issue right now, and we should have a report available in 2 to 3 months. I do not know how this time scale meets your needs, but that is the time scale we have before us.

Senator **Schmitt**. If there were some interim information you could make available to us, it would be very helpful.

Dr. **Dresselhaus**. I will do so, especially if you can tell me what the time scale is. We will make every effort to comply.

Senator **Schmitt**. We should complete our markup on the authorization within the month, and the conference certainly within 2 months; so it is pretty short.

Dr. **Dresselhaus**. Well, we will do what we can in that time frame.

I want to make a second comment. I totally agree with you in what you have said about the difficulties involved in legislating in the science and technology field. I want to say the same thing in somewhat different words as we see it from evaluation panels.

Science and technology has expanded enormously in the last 15 years, and yet the size of the Bureau programs remain more or less static. That makes it very difficult to decide which areas of the new technology one should pursue vigorously and which areas one will have to therefore neglect.

The computer area, of course, is one of those areas which has expanded enormously. Now, if you are going to give that area full support or adequate support, it would require very significant cutbacks in the major standards programs in other areas. It is not really possible to keep up with science and technology expanding at a rapid rate when you must deal with a static or diminishing budget. And I think that this general funding issue is a major concern.

Senator **Schmitt**. Well, there is no question we must continually examine these issues. This subcommittee will, and the full committee will also, examine the appropriateness of various activities within the Bureau or NASA or any other science agency. But I do not see how we can turn our back on what is clearly a justifiable, historically justifiable traditional role in some areas—the Bureau, NASA, NOAA, NSF-like activities—just because someone decided that the industry activity is going to be sufficient to cover the waterfront when we know from a historical point of view that it will not be.

Our basic legal structure, particularly the antitrust structure, as well as the competitive nature of the free enterprise system make it essentially impossible for industry to perform certain types of necessary integrating activities.

Fifty years ago this was not the case. We were still much more the inventor of new ideas at that time rather than the integrator of new ideas as we are now. And when you start talking about the integration of new ideas, there must be an arbiter, standards-setter, legal umbrella in which the various participants in a free enterprise system can cooperate. And I think your argument and that of others is correct: To destroy that now would put us at an even greater competitive disadvantage in the world market than we currently face as a result of other problems we have built into our economic system.

We will have some additional questions for the record for you, and I hope we can get answers.

Following up on your testimony on the metal processing program, the equipment and instrumentation, I agree with you. I think not only here but elsewhere once you say there is a role for the NBS, you must replace its basic plant so it can carry out that role. Otherwise, you must close the doors if it cannot keep up with the progress in the industry it is supposed to be serving.

And I do not think we will even try to get in today into what happens when you start having metal processing in space, Doctor, and the changes that will come in standards as a consequence of that.

Dr. **Walters**. It is a very exciting area.

Senator **Schmitt**. The idea that you can put together metal alloys and emulsions in an environment where convection is not an operative process is tremendously exciting for the metal processing industry. But even in that context I do not believe it is possible under our current legal structure except in cooperation with the government for the various metal industries to get together and work out joint experiments or joint standard-setting or what have you. It just cannot be done unless the Bureau does it, unless NASA does it, or some other governmental organization acts as its coordinator.

Fire research, Doctor, is an area of tremendous public concern. It is a threat all of us have in the back of our minds practically every night when we go to bed in our homes or in every building we go into or every elevator we use, particularly in the high-rise buildings.

I remember conversations with the late Mayor Daley of Chicago. He had developed an intense personal concern back in 1973 and before that time about fire dangers in high-rise buildings, and wondered out loud to me why we cannot build essentially fireproof buildings. And I allowed that yes, you could build fireproof buildings. The question is what you put in them. Just about everything we have been putting in buildings for a long time, including human beings, are flammable under the right conditions.

That basic issue of prevention, as with preventitive medicine and other activities, is really the core, is it not, to what the Bureau must be looking at in the future in this area?

Dr. AMBLER. Yes. I have Dr. Lyons with me who could answer some of the more technical aspects of your question.

I want first, though, to assure you that I attach great importance to our fire research program, and in fact, you will see in the 1983 budget request that although FEMA did drop the funding, we are picking it up. So I think that is an indication of the importance that we attach to it.

As for the technical aspect of your question, I think Dr. Lyons is better able to answer it.

Senator SCHMITT. Dr. Lyons has certainly been well recognized for his contributions. I might add for the record I believe I am correct in saying he was the only Department of Commerce employee in 1981 awarded the $20,000 Presidential award for outstanding management.

Dr. Lyons, you are to be congratulated.

Dr. LYONS. Thank you, Senator.

I would just make a brief comment on your question with regard to Mayor Daley's concerns. I think it is true of high-rise buildings today that the technology exists to make them as safe as most of us would think was reasonable. The question is cost.

Senator SCHMITT. Yes.

Dr. LYONS. And when I look at a high-rise structure and a disaster such as occurred in the MGM Grand Hotel, there are always two questions which come up. One is the issue of making cost tradeoffs in the design. We know if we want to spend the money, if we want to put up with certain uncomfortable surroundings we would be virtually assured of being protected from fire. Most people do not want to live in all-concrete surroundings in asbestos clothes and so forth, so you must make tradeoffs.

One of the things the Bureau tries to do is provide a rational basis for making these tradeoffs. They involve such things as whether we will have fire-resistant barriers or will install sprinklers. In some cases you need not have both. You can save large sums of money in construction if you can satisfy yourself as to the level of safety.

The second concern, which is much more difficult for us to address, is: Given an appropriate code which calls up the necessary fire safety measures or building structural safety measures, how does one assure adequate enforcement of the code?

Most of the disasters we look at—the MGM Grand Hotel is an excellent recent case in point or the very bad supper club fire, you may recall it, in Kentucky a few years ago—inevitably when we look at these very large disasters with deaths of 50, 100, or 150 people it turns out that the building was not in compliance with the code. We had the same experience last year with the Hyatt Regency Hotel walkway collapse in Kansas City. The walkways were not in compliance.

Senator SCHMITT. And Houston, Tex., last week.

Dr. LYONS. Always they are not in compliance. I can think of no major disaster we have had in either building structural safety or fire safety where the code was adhered to.

Senator SCHMITT. Doctor, if I can interrupt here, you all will be taking over FEMA's responsibilities in these areas, will you not? Is that the intent?

Dr. LYONS. Well, FEMA had no responsibility in fire and disaster investigation other than one shared with the Bureau in which we jointly sponsored contracts for private investigation by the National Fire Protection Assoication. But there is no legislative mandate to either organization to investigate fires.

Senator SCHMITT. What is the U.S. Fire Administration under FEMA's role in this area?

Dr. LYONS. In investigating fire disasters?

Senator SCHMITT. Well, what does it do? You were going to get all of the funding. The Fire Administration would be phased out. What role are you assuming then?

Dr. LYONS. We are only transferring the funding. There is no transfer of authority or responsibility. We are simply getting the money which was earlier passed through to the Bureau. Now we will get it directly for the same program.

Senator SCHMITT. We will check with FEMA what they intend to do with their office.

Dr. Ambler or Dr. Lyons, will you plan to develop a comprehensive program of communication with State and local governments?

Dr. LYONS. On the fire issue?

Senator SCHMITT. In the fire area.

Dr. LYONS. We have very good communication with State and local governments through the code authorities. We deal with the model code groups first to draft the proposed code provisions. Then we deal with the National Conference of States for Building Codes and Standards for whom we provided until recently the secretariat, and we deal directly with the major city building codes group which has its own organizations. We hold workshops for them. We talk to them individually on special problems as they come up, and we certainly will continue to do that. Our funding will be sufficient for that purpose.

Senator SCHMITT. Thank you.

Dr. Ambler, we will have some other questions for the record. Unfortunately, we are running out of time.

Do you have any formal relationship with the Department of Defense in terms of interchange of information developed within the Bureau?

Dr. AMBLER. There is not a formal umbrella arrangement with them, but there are a number of individual formal arrangements and a number of working relationships. Two spring to mind. One is with the central calibration laboratories of the Army, Navy, and Air Force. We have an umbrella contract with them. Another is working with the Defense Department in their Integrated Computer-Aided Manufacturing [ICAM] program, which is related to computer manufacturing and design. The Air Force has several projects, and we work closely with them in the context of our automation program.

Senator **Schmitt**. Do you sense any duplication of effort between the various DOD laboratories and NBS?

Dr. **Ambler**. No; I have never run across that.

Senator **Schmitt**. Are you able to use the information they develop in your standards setting?

Dr. **Ambler**. In the areas I mentioned we work very closely; for example, in the calibration case we sit down and analyze the upcoming requirements for calibration services within the armed services, and if it is needed, if we need to develop any basic measurements through research, we do it. So I think there is a good working relationship and no duplication. It is more of a working together to get a job done.

Senator **Schmitt**. Do you get reimbursable funding from DOD?

Dr. **Ambler**. Yes, sir.

Senator **Schmitt**. What proportion of your reimbursable funds come from DOD?

Dr. **Ambler**. My Deputy is telling me that it is $15 million in fiscal year 1982. I think it is a little higher. It is changing, you see. The other agency funding we used to receive in total was always greatest from the Department of Defense until recently when it has been greatest from the Department of Energy.

Now that pattern is shifting, and I think the Defense Department in total accounts for the largest portion of our other agency funding.

Senator **Schmitt**. In 1981 approximately 35 percent of your support apparently came from other agencies, and in 1982 that had dropped to about 31 percent. Do those figures seem about right to you?

Dr. **Ambler**. Yes.

Senator **Schmitt**. Do you find it difficult to handle the inherent uncertainty that comes with reimbursable funding?

Dr. **Ambler**. We have not, no. It has never been a really serious problem. At times, we need to make some adjustments, but nothing that any competent manager should not be able to do.

I guess we are a little nervous with the general cutback in the Federal budget as to what will happen in 1983, but we were nervous about 1982 and that seems to be coming out all right, so I guess we have reason to be optimistic about 1983.

Generally, we have always had the feeling we could take on much more work than we had staff to do.

Senator **Schmitt**. So you do not have any inherent aversion to reimbursable funds?

Dr. **Ambler**. Absolutely not at all, sir. Personally, I think it is a very good thing for many reasons, not the least of which it helps us to get plugged in to all the Federal technology programs and know what is going on and be responsive. I think it is a very important part of the Bureau's activities and always has been, and I think we should keep it that way.

Senator **Schmitt**. None of the agencies are kind enough to give you some of their employment slots when they transfer money, are they?

Dr. AMBLER. No. And generally they do not fund our longer range work either, so that is a bit of a problem.

Senator SCHMITT. Since you are going to directly get the money that FEMA was sending as a reimbursable, are you gaining some relief on personnel slots as a result?

Dr. AMBLER. That happens not to be a problem because the people working on the program, although not counted in the congressional appropriation, are shown in our budget on the back pages. Our working capital fund covers all of the positions that work on our reimbursable programs, so it is just a matter of an accounting change.

Senator SCHMITT. I wish we could go on. It is a fascinating agency which does outstanding work and I hope will continue to do so. But I must move on to our next topic.

Thank you very much. If we may, we will send some questions for the record, and we will try to get some further extensions of your already excellent testimony.

Thank you.

Our next witness is Dr. Joseph Caponio. Did I pronounce that right?

Dr. CAPONIO. That is correct.

Senator SCHMITT. Acting Director of National Technical Information Service.

And if you again would summarize your testimony as is appropriate, we will have a few questions for you, Dr. Caponio.

STATEMENT OF DR. JOSEPH F. CAPONIO, ACTING DIRECTOR, NATIONAL TECHNICAL INFORMATION SERVICE

Dr. CAPONIO. Thank you, Mr. Chairman.

Thank you for this opportunity to discuss the programs of the National Technical Information Service to request the authorization of appropriations for them for fiscal years 1983 and 1984, and to request the enactment of legislation establishing a revolving fund for NTIS.

NTIS makes Federal technological, scientific, economic, and engineering information accessible to business, industry, government, and other individuals and organizations.

NTIS activities are managed through freely based programs: the information clearinghouse program, which is fully supported by user charges; the patent licensing program; and the technology transfer program.

Section 3 of the draft bill attached to Dr. Ambler's written testimony would authorize appropriations to the Secretary of Commerce in the amount of $1,980,000 for fiscal year 1983 and such sums as may be necessary for fiscal year 1984 to carry out those activities of the National Technical Information Service which are not self-supporting.

I would like to discuss the composition of the $1,980,000 requested in fiscal year 1983 in the context of a brief description of the three programs I just mentioned.

Through the information clearinghouse program NTIS fulfills its role as the central source for the public sale of research, development, and engineering reports prepared or sponsored by Federal, State, and local government agencies, their contractors or grantees, or by special technology groups. As a self-supporting program no authorization or appropriation is requested for it in fiscal years 1983 or 1984.

The patent licensing program encourages licensing for royalties of U.S. Government-owned inventions. The program brings selected inventions from a number of Government agencies to the attention of U.S. industry through established industry contacts and industry promotions. Of the $1,980,000 we are requesting for fiscal year 1983, $100,000 will be used to pay maintenance fees on foreign patents owned by the United States and licensed to industry. The remaining program costs $400,000 and will be recovered through reimbursements from the Department's Office of Productivity, Technology, and Innovation, which has overall responsibility for coordinating Federal patent policy.

The technology transfer program seeks to help stimulate productivity in the United States by means of two subprogram elements: the foreign technology acquisition subprogram helps to increase the U. S. industrial sector utilization of selected foreign technological information. The dissemination of patent information subprogram seeks to improve the access and utilization by the U.S. engineering community of technological information that exists in patents.

Of the $1,980,000 we are requesting for fiscal year 1983, $252,000 is for the technology transfer program. The remaining $1,628,000 is for the final year of a 2-year program to modernize NTIS' computer system.

On February 26, 1982, the Secretary of Commerce transmitted to Congress administration-approved draft legislation to establish a revolving fund to be used by the Secretary of Commerce to carry out all activities of NTIS. I urge you to include this legislation as a separate title in the authorization bill you report out for NBS and NTIS.

NTIS presently uses a trust fund account to finance its operations. A trust fund has not proven to be adequate because it does not provide working capital to finance operations during low cash flow periods, and it does not permit net earnings to be retained to develop such capital or to purchase capital assets.

The draft bill would authorize a one-time appropriation of $5 million to provide a corpus for that fund. This corpus can be thought of as a line of credit. During low cash flow periods NTIS would draw upon this capital to finance operations. During high cash flow periods this capital would be replenished from revenues.

Before concluding, Mr. Chairman, I would like to discuss one other item of interest to the subcommittee. The Smithsonian Science Information Exchange terminated operations October 31, 1981. SSIE had been a central source of information of federally supported research in progress over the last 10 years. Federal agencies provided SSIE with abstracts of ongoing research projects from which SSIE produced computer printouts in various subject areas for sale to the public.

NTIS has assumed responsibility for maintenance and updating of this machine-readable data base that includes records describing approximately 300,000 current research projects. Monthly updates will be provided through lease arrangements to the major online vendor systems in the United States, assuring continued public accessibility.

The Office of Science and Technology Policy is working closely with NTIS during this transition period and has convened several meetings of representatives from the appropriate source agencies. This cooperative effort should ensure development of an efficient, responsive and useful system for reporting ongoing federally sponsored research.

This concludes my statement, Mr. Chairman. I shall be happy to answer or attempt to answer any of your questions.

Senator SCHMITT. The patenting licensing program, does that involve patents from all Federal agencies owned by the Federal Government?

Dr. CAPONIO. It involves the patents from not all of the Federal agencies but from many, including the National Institutes of Health, the U.S. Department of Agriculture, some of the Department of Defense. It excludes at the present time patents generated within the NASA program and the Department of Energy. So it does not represent the patents generated in all of the Government.

Senator SCHMITT. Is there any record of success in licensing?

Dr. CAPONIO. The record of success in licensing has been achieved in recent years. However, in terms of the royalties accruing to the Federal Government, I would say, Mr. Chairman, because of the lead time involved in the commercialization of the particular patent, we have not yet actually seen the best results.

Senator SCHMITT. How many patents are under your jurisdiction?

Dr. CAPONIO. At the present time approximately 28,000 patents comprise the Federal patent.

Senator SCHMITT. But how many under your jurisdiction? Many of those are NASA. Many of them are Department of Defense. Half?

Dr. CAPONIO. Excuse me, sir.

[Pause.]

The number of exclusive licenses granted by the Department is approximately 54.

Senator SCHMITT. Out of how many patents under your licensing jurisdiction—10,000, 15,000?

Dr. CAPONIO. As I mentioned, Mr. Chairman, we are responsible for the 28,000 patents in terms of attempting to license.

Senator SCHMITT. But you just eliminated NASA, DOD, and portions of Defense. I am trying to find out, that 54 represents how many?

Dr. CAPONIO. That we have actually licensed.

Senator SCHMITT. But how many do you have responsibility for? You said you did not have responsibility for NASA, DOE, or DOD.

Dr. CAPONIO. That is correct.

Senator SCHMITT. So how many are we talking about? How many do you have responsibility for?

Dr. CAPONIO. Approximately 2,700, Mr. Chairman.

Senator SCHMITT. And is your office responsible for negotiating the royalty agreements?

Dr. CAPONIO. Yes, Mr. Chairman.

Senator SCHMITT. Could you provide for our record a summary of the types of royalty agreements those 54 patents represent? I am sure they vary from agreement to agreement, but if you could give us some general information about that, or if they can be summarized in a reasonable document maybe for all 54.

Dr. CAPONIO. Yes, Mr. Chairman. We will do that for the record.

[The following information was subsequently received for the record:]

SAMPLE LISTING—ROYALTY BEARING PATENT LICENSES

Invention title (Agency) patent/patent application number	Company	Type of license—royalty terms
Hepatitis vaccine "B" (NIH) 3,636,191	Merck & Co.; Cutter Laboratories	Nonexclusive; execution fee $10,000; running royalties: 1 percent domestic, 2 percent foreign.
Leukemia drug (NIH) 3,856,959	Collaborative Research	Exclusive; execution fee $2,000; annual minimum $5,000 running royalties 5 percent.
Satellite digital clock (NOAA) 4,014,166	Austron Corp.	Nonexclusive; execution fee $1,000; annual minimum $1,000; running royalties 3 percent.
Low pH cationic starch (USDA) 4,127,563.	National Starch & Chemical	Nonexclusive; execution fee $1,000; annual minimum $1,000; running royalties 3 percent.
Cis-Platinum II cancer drug (VA) 4,115,418.	Bristol Laboratories	Exclusive; execution fee $2,000; annual minimum $5,000; running royalties 5 percent.
Blood cell separator (NIH) S.N. 817,016	IBM	Nonexclusive; execution fee $2,000; annual minimum $2,000; running royalties 3 percent.
Fiber optic pH probe (NIH) 4,194,877, 4,200,110.	Hoffman LaRoche; Litton Medical Electronics; Advanced Technology Labs.	Nonexclusive; execution fee $1,000; annual minimum running royalties 3 percent.
Laser wavelength meter (NBS) 4,173,442.	Molectron Corp.; Lasertechnics, Inc.	Nonexclusive; execution fee $2,000; annual minimum $2,000; running royalties 3 percent.
Monoclonal antibodies for herpes virus (NIH) S.N. 181,954.	Abbott Laboratories	Nonexclusive; execution fee $2,000; 3 percent running royalty.
Cis-Platinum II complexes for chemotherapy (VA) S.N. 58,287, S.N. 155,531.	Adria Laboratories	Exclusive; execution fee $2,000; annual minimum $5,000; running royalties 5 percent.
Ultra-Black surface coating (NBS) 4,233,107.	Ball Aerospace Corp.	Nonexclusive; execution fee $1,000; running royalties 3 percent.
Detection of non-A, non-B hepatitis (NIH) S.N. 105,079.	North American Biologicals; Abbott Laboratories.	Nonexclusive; execution fee $1,000; annual minimum $2,000, running royalties 5 percent.
Modified sulfur cement (DoI) S.N. 85,450, S.N. 266,484.	J. A. Reece & Co. Sulcon, Inc.; Chevron Research; Chemical Enterprises; F. B. Coatings.	Nonexclusive; execution fee $500; running royalties $2 per long/ton cement; 50 cents long/ton concrete.
13-Cis retinoic acid for treating acne (NIH) S.N. 63,770, S.N. 175,594.	Ortho Pharmaceuticals; Westwood Pharmaceuticals.	Nonexclusive; execution fee $2,000; running royalties 3 percent.
Toluidine blue rinse for detecting cancer in mouth (VA) S.N. 105,079.	Block Drug Co	Exclusive; execution fee $2,000; annual minimum $2,000; running royalties 5 percent.
Nematocide (USDA) 4,036,987, 4,073,939.	Pennwalt Corp	Exclusive; execution fee $2,000; annual minimum $2,000; running royalties 2 percent.
Large unilamellar vesicles (NIH) 4,078,052.	Abbott Laboratories	Nonexclusive; execution fee $2,000; running royalties 3 percent.
Zwitterionic detergent for protein (NIH) S.N. A181,465.	Pierce Chemical Co.; Polysciences; Calbiochem; Serva.	Nonexclusive; execution fee $1,000; running royalties 4 percent.
Apparatus for detecting clear air turbulence (NOAA) 4,266,130.	Bendix Corp	Nonexclusive; execution fee $1,000; annual minimum $2,000; running royalties 3 percent.

SAMPLE LISTING—ROYALTY BEARING PATENT LICENSES—Continued

Invention title (Agency) patent/patent application number	Company	Type of license—royalty terms
Radioreceptor assay for benzodiazepines in plasma (NIH) 4,239,744.	Neurobiological Sciences	Exclusive; execution fee $2,000; annual minimum $2,000; running royalties 4 percent.

Senator SCHMITT. Is it the administration's plan to contract out the clearinghouse program?

Dr. CAPONIO. At the present time, Mr. Chairman, there is under review by the Department, in keeping with the administration's policy wherever it is technically feasible and economically feasible and in the public interest to perhaps consider at least the feasibility of contracting out either all or some of the functions of the National Technical Information Service.

This particular study is under way, and I do not believe there will be any recommendations or decisions concerning the various options or feasibilities for several months.

Senator SCHMITT. You have no time frame you are shooting for to complete that study?

Dr. CAPONIO. Not to my knowledge. I would dare say it might be as long as 5, 6, or 7 months before the study is completed.

Senator SCHMITT. When you took over the operation of the Smithsonian Science Information Exchange there was a data base of some 300,000 current or recently funded research projects. Unfortunately, it appears that not all agencies cooperated with this service. Has that situation remained, or has there been some improvement?

Dr. CAPONIO. There has been a considerable improvement in the inputting of the ongoing research activities to the National Technical Information Service. There are some difficulties in assuming responsibility during the transition. We are placing, as a result of a more cooperative and collaborative approach, more emphasis on utilizing the input prepared by the originating agencies. For example, we will use the record that is prepared by the Department of Defense, by NASA, by the Department of Energy, by NIH, and accept that record as such and integrate it into a coherent system.

Senator SCHMITT. Are you getting assistance from OMB in getting the agencies to cooperate with this service?

Dr. CAPONIO. At the present time we are working mostly with the Office of Science and Technology in policy and apprising the OMB, but at the present time we are relying mostly on the collaborative approach that has been manifested by all of the major agencies.

Senator SCHMITT. How many requests per year does the exchange get for information on federally funded research projects? Can you supply that for the record?

Dr. CAPONIO. Yes, Senator. I would like to supply it for the record, if I may.

[The following information was subsequently received for the record:]

For fiscal year 1981, the Smithsonian Science Information Exchange received 7,000 requests for custom searches. In addition, the Smithsonian Science Information Exchange vendors received an additional 15,600 requests, for a total of 22,600.

Senator **Schmitt**. Is the Science Information Exchange included in the study of potential private sector operations of NTIS?

Mr. **Caponio**. That would be an integral part of the study, yes, Mr. Chairman.

Senator **Schmitt**. The technology transfer program you indicated is to increase utilization of foreign technological information and to disseminate U.S. patent information or at least technology incorporated in patents under your jurisdiction.

Can you give us some measure of the success of this program?

Dr. **Caponio**. Mr. Chairman, within the last year to 2 years we have made available for the first time in the history of the Department, for example, the patent files developed by the PTO. This is now being made available to U.S. business and industry through commercialization to the private sector vendors.

At this time I might say that it is very difficult to assess the achievements other than to specify that we know these patent files are now being utilized by a large segment of U.S. industry. But in terms of trying to quantify, it would be extremely difficult at this moment.

Senator **Schmitt**. How do you select the foreign technology information to be disseminated?

Dr. **Caponio**. The basic strategy for acquiring and selecting foreign technology is based upon the premise that much of the foreign technology that is not published in the scholarly and professional journals resides in the form of technical report literature akin to the kind of report literature the NTIS makes available to U.S. business.

These technical reports are generally prepared either by Government-sponsored activities or private sector activities. And the attempt at the moment is to develop contacts, especially in the developed countries whereby most of the technical report literature or the engineering report literature are generated.

We exercise the same selectivity in terms of trying to cover much of what is the best in science and technology from our perspective.

Senator **Schmitt**. Do you have any cooperative arrangement with the State Department and their embassy personnel?

Dr. **Caponio**. Yes, Mr. Chairman. We have a cooperative program and arrangement with virtually all of the scientific attaches in the various countries. We also have a program in collaboration with AID whereby we make our own technological information available to the lesser developed countries.

Senator **Schmitt**. Are you familiar with the patent bill reported out of this committee, S. 1657?

Dr. **Caponio**. Yes, sir, Mr. Chairman, I am.

Senator **Schmitt**. What impact do you expect passage of that bill or something like it to have on your patent licensing program?

Dr. **Caponio**. Mr. Chairman, I am not sure what impact except to indicate that many of the Government inventions and patent licensings that the NTIS is responsible for or actually negotiates are usually those inventions stemming from the intramural, the actual employees of the Federal Government. So the impact there would be minimal. On the other hand, those inventions that are derived from Federal funding and R. & D. on the private sector I would say the impact would be extremely favorable.

Senator SCHMITT. Thank you. We may have some more questions for the record, and if you would supply the information requested for the record, we would appreciate it.

Dr. CAPONIO. Yes, Mr. Chairman, I will.

[The statement follows:]

STATEMENT OF JOSEPH F. CAPONIO, ACTING DIRECTOR, NATIONAL TECHNICAL INFORMATION SERVICE, U.S. DEPARTMENT OF COMMERCE

Mr. Chairman and Members of the Subcommittee: Thank you for this opportunity to discuss the programs of the National Technical Information Service (NTIS), to request the authorization of appropriations or them for fiscal years 1983 and 1984, and to request the enactment of legislation establishing a revolving fund for NTIS.

The Act of September 9, 1950 (15 U.S.C. 1151-1157) directs the Secretary of Commerce to establish and maintain within the Department of Commerce a clearinghouse for the collection and dissemination of scientific, technical and engineering information. NTIS was established as a primary operating unit of the Department to serve as that clearinghouse. NTIS makes Federal technological, scientific, economic and engineering information accessible to business, industry, Government, and other interested individuals and organizations. Use of the technological information that NTIS disseminates serve to: improve the economic health and growth of U.S. firms, help increase productivity and innovation in the U.S., contribute to the improvement of the competitive position of U.S. industry in the world marketplace, and promote the utilization of foreign research and development within the U.S. industrial sectors.

In the conduct of its program, NTIS provides and promotes a full array of products and services designed to permit wider utilization of technology and serves as the primary source for the public sale of Government-sponsored research and engineering reports, research in progress reports, machine-processed data files, and computer programs. NTIS activities are managed through three programs: The Information Clearinghouse Program (which is fully supported by used charges), the Patent Licensing Program, and the Technology Transfer program.

Section 3 of the draft bill attached to Dr. Ambler's written testimony would authorize appropriations to the Secretary of Commerce in the amount of $1,980,000 for fiscal year 1983 and of such sums as may be necessary for fiscal year 1984 to carry out those activities of the National Technical Information Service which are not self-supporting. I would like to discuss the composition of the $1,980,000 requested for fiscal year 1983 in the context of a brief description of the three programs I just mentioned.

Through the Information Clearinghouse Program NTIS fulfills its role as the central source for the public sale of research, development, and engineering reports prepared or sponsored by Federal, State and local government agencies, their contractors and grantees, or by special technology groups. This specialized technological information is disseminated to business, industry, government, and the public. Products and services offered for sale through the Information Clearinghouse Program directly support U.S. Government and industry research and development and U.S. foreign policy goals by helping the social and economic development of other nations. In fiscal year 1981, the Information Clearinghouse Program became totally self-supporting for all routine operating costs. We expect revenues from the sale of products and services to be approximately $27,000,000 for fiscal yer 1983. As a self-supporting program, no authorization of appropriations is requested for it in fiscal years 1983 or 1984.

The Patent Licensing Program encourages licensing, for royalties, of U.S. Government-owned inventions. It is the government's only centralized and comprehensive attempt at commercializing government patents through the incentives provided by limited term exclusive licenses. The program brings selected inventions from a number of government agencies to the attention of U.S. industry through established industry contacts and industry promotions. A limited number of inventions, identified through consultation with industry, are filed overseas to obtain patents to protect foreign markets, and to prevent unrestricted, uncompensated use by foreign competitors. Since 1975, this program has increased access to Government invention technology, and companies are committing tens of millions of dollars in research and development and new plant investment under these licenses. Of the $1,980,000 we are requesting for fiscal year 1983, $100,000 will be used to pay maintenance fees on foreign patents owned by the United States and licensed to industry. Remaining program costs ($400,000) will be recovered through reimbursements from the Department's Office of Productivity, Technology, and Innovation, which has overall responsibility for coordinating Federal patent policy.

The Technology Transfer Program seeks to help stimulate productivity in the United States by means of two subprogram elements: the Foreign Technology Acquisition Subprogram helps to increase the U.S. industrial sector utilization of selected foreign technological information. This is accomplished by collection, translating, and disseminating to U.S. industry, scientific and technical information originating outside the United States and deemed by industry representatives to be of value. The Dissemination of Patent Information Subprogram seeks to improve the access and utilization by the U.S. engineering community of technological information that exists in patents.

Of the $1,980,000 we are requesting for fiscal year 1983, $252,000 is for the Technology Transfer Program. This is a reduction of $400,000 from the fiscal year 1983 base. The $252,000 will be used for the Foreign Technology Acquisition Subprogram. Reductions in program costs, coupled with offsetting receipts, will permit a reduction of $250,000 form the fiscal year 1983 base of $502,000 for the program. No money is requested for the Dissemination of Patent Information Subprogram, since it was only funded for one year start-up costs of $150,000 in fiscal year 1982. NTIS will disseminate patent information through the Information Clearinghouse Program in fiscal year 1983 and beyond on a self-supporting basis.

The remianing $1,628,000 is for the final year of a two-year program to modernize NTIS' computer system. The new computer system will improve the productivity of NTIS operations by replacing two unreliable and outmoded IBM 360/65's with reliable current generation equipment and supporting software. We are replacing existing ADP applications with modern data base concepts and input/output devices. The old computers and their existing programmed applications are unable to meet the basic NTIS operating needs, let alone any additional workload requirements. The $1,628,000 will complete the modernization started in fiscal year 1982.

On February 26, 1982 the Secretary of Commerce transmitted to Congress Administration-approved draft legislation to extablish a revolving fund to be used by the Secretary of Commerce to carry out all activities of NTIS. I urge you to include this legislation as a separate title in the authorization bill you report out for NBS and NTIS. This revolving fund will utilize a cost accounting system similar to the system used by private companies. All NTIS expenses would be paid from the fund, and the fund would be reimbursed from sales receipts or appropriated funds. A copy of this draft legislation and an accompanying statement of purpose and need in support thereof are attached to this testimony.

NTIS presently uses a trust fund account to finance its operations. A trust fund has not proven to be adequate because it does not provide working capital to finance operations during low cash-flow periods and it does not permit net earnings to be retained to develop such capital or to purchase capital assets.

NTIS experiences broad fluctuations in cash-flow and no reservior of working capital exists to finance operations during times of low cash inflow. As a result we must draw upon funds advanced by customers (deposit accounts) to help finance operations during these low cash-flow periods. The Department of Commerce, the Office of Management and Budget (OMB) and the General Accounting Office (GAO) all agree that this practice is undesirable and should be eliminated through the establishlment of a revolving fund which would receive a one-time appropriation for working capital to finance inventories and provide support during low cash periods. The draft bill would authorize a one-time appropriation of $5,000,000 to provide a corpus for the fund. This corpus can be thought of as a line of credit. During low cash-flow periods, NTIS would draw upon this capital to finance operations. During high cash-flow periods, this capital would be replenished from revenues. The establishment of a revolving fund also will allow us to modernize our financial practices, assist in matching costs with revenues, allow for more accurate representation of NTIS overall financial status and generally improve management control over operations.

Before concluding, I would like to discuss one other item of interest to the Subcommittee. The Smithsonian Science Information Exchange (SSIE) terminated operations on October 31, 1981. SSIE had been a central source of information of Federally supported research in progress over the last 10 years. Federal agencies provided SSIE with abstracts of ongoing research projects from which SSIE produced computer printouts in various subject areas, for sale to the public.

NTIS has assumed responsibility for maintenance and updating of this machine-readable data base that includes records describing approximately 300,000 current research projects funded by Federal agencies. Monthly updates will be provided through lease arrangements to the major on-line vendor systems assuring continued public accessibility.

The Office of Science and Technology Policy is working closely with NTIS during this transition period and has convened several meetings of representatives from appropriate source agencies. This cooperative effort should ensure development of an efficient, responsive, and useful system for reporting ongoing Federally-sponsored research.

This concludes my prepared statement. I will try to answer any of your questions.

Attachments.

A Bill To enhance the transfer of technical information to industry, business and the general public by amending the Act of September 9, 1950 (64 Stat. 823-824; 15 U.S.C. 1151-1157), as amended, to establish the Technical Information Clearinghouse Fund, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the Technical Information Clearinghouse Fund Act of 1982.

"SEC. 2. The Act of September 9, 1950 (64 Stat. 823-824; 15 U.S.C. 1151-1157), as amended, is further amended by adding, after Section 7, the following new Section 8:

"TECHNICAL INFORMATION CLEARINGHOUSE FUND"

"SEC. 8. (a) There is established in the Treasury of the United States the Technical Information Clearinghouse Fund (hereinafter 'Fund'). The Fund shall be available to the Secretary of Commerce, without fiscal year limitation, for use as a revolving fund to carry out the activities authorized in this Act and any other activities lawfully assigned by the Secretary to the clearinghouse established under this Act (hereinafter 'clearinghouse activities').

"(b) There shall be deposited or included in the Fund—

"(1) All fees, advances, and reimbursements received from any source for products and servicies furnished, or to be furnished, by the clearinghouse;

"(2) All receipts from the sale, rental, or exchange of property used by the clearinghouse and all receipts in payment for any loss or damage to such property;

"(3) All receivables, inventories and other assets associated with clearinghouse activities; and

"(4) Any sums appropriated by law for the conduct of clearinghouse activities.

"(c) The Fund shall be available to the Secretary for the payment of all costs of conducting clearinghouse activities, including the payment of any financial obligations related to clearinghouse activities which were undertaken by the Secretary prior to the establishment of the Fund or which are subsequently transferred to the Fund by law or in conjunction with any reorganization authorized by law.

"(d) The Secretary may refund from the Fund any fee paid by mistake or in excess of that required.

"(e) At the close of each fiscal year, the Secretary shall transfer to the general fund of the Treasury any amount in the Fund that exceeds any present and reasonable future requirements of the Fund.

"(f) As used in this chapter, the term 'cost' or 'costs' shall be construed to include all directly related expenses and appropriate charges for indirect and administrative expenses, including: accrued leave; uncollectible accounts; cost of sales; developmental costs; depreciation; inventory obsolescence; and financial obligations related to clearinghouse activities undertaken prior to the establishment of the Fund or subsequently transferred to the Fund by law or in conjunction with any reorganization authorized by law.

"SEC. 3. There is authorized to be appropriated to the Secretary of Commerce not to exceed $5,000,000 for working capital for the Technical Information Clearinghouse Fund.

"SEC. 4. Section 3 of the Act of September 9, 1950 (15 U.S.C. 1153) is amended by adding the following sentence at the end of the first paragraph: 'Such schedule or schedules of fees or charges, to the fullest extent feasible, shall reflect the costs of the products and services offered.'

"SEC. 5. This Act shall be effective on the first day of the first fiscal year which begins after the date of its enactment."

STATEMENT OF PURPOSE AND NEED

I. INTRODUCTION

The Act of September 9, 1950 (15 U.S.C. 1151-1157), which the accompanying draft legislation would amend, directed the Secretary of Commerce to establish a clearinghouse for the collection and dissemination of scientific, technical and engineering information. The Secretary established, within the National Bureau of Standards (NBS), the Clearinghouse for Federal Scientific and Technical Information to perform the clearinghouse function. Later, through issuance of Department Organization Order 30-7A in September 1970, the Secretary created a new operating unit of the Department of Commerce, the National Technical Information Service (NTIS), and reassigned the clearinghouse function to it.

NTIS is the central source for the public sale of research, development and engineering reports and other analyses prepared by Government agencies, their contractors and grantees, and selected non-Governmental entities. It is also the central source for sales of Government-generated computer-processable data files. Pursuant to Section 3 of the Act of September 9, 1950 (15 U.S.C. 1153), NTIS sells its products and services on a self-sustaining basis. Gross sales are about $22 million annually. Eighty-five percent of revenues come from sales to the public; the remainder derives from sales to Government agencies.

The NBS Clearinghouse for Federal Scientific and Technical Information utilized the joint authority of the Act of September 9, 1950 (15 U.S.C. 1151-1157) and Subsection 2(19) of the Act of March 3, 1901 (15 U.S.C. 272(19)) as the basis for the conduct of its activities. Upon the establishment of NTIS in September 1970 and the transfer of NBS' clearinghouse functions to it, the Department of the Treasury assigned a "trust" fund (symbol 13x8546) to account for NTIS's activities in accordance with Section 2 of the Act of Sepcember 25, 1970 (15 U.S.C. 1526) which provides, in pertinent part:

> All payments for work or services performed or to be performed under this Act shall be deposited in a separate account or accounts which may be used to pay directly the costs of such work or services, to repay or make advances to appropriations or funds which do or will initially bear all or part of such costs, or to refund excess sums when necessary: *Provided*, That said receipts may be credited to a working capital fund otherwise established by law, and used under the law governing said funds, if the fund is available for use by the agency of the Department of Commerce which is responsible for performing the work or services for which payment is received. * * *

The trust fund accounts for sales to the public. The consolidated working fund "holds" monies advanced from other Government agencies until goods are shipped or services rendered. Income thus realized is transferred to the trust fund. Prior to fiscal year 1981, appropriations financed the General Services Administration's Standard Level User Charge for the facilities it leases for NTIS's use. Beginning with fiscal year 1981 this expense is being fully financed from income.

II. DEFICIENCIES OF CURRENT SYSTEM

The Department of Commerce, the General Accounting Office (GAO), and the Office of Management and Budget (OMB) have jointly concluded that the NTIS trust fund is not adequate for NTIS's needs. Use of a trust fund has caused problems for NTIS. Two of these problems illustrate the need to enact this legislation.

First, because it must use a trust fund, NTIS lacks needed working capital. NTIS operates on an accrual basis and has balances of receivables and payables that vary over time. Consequently, NTIS experiences broad fluctuations in cash flow. However, because it is not now permitted to retain net earnings in order to develop working capital, it has no reservoir of working capital to finance operations during low cash periods. At present, NTIS must draw upon funds advanced by customers (deposit accounts) to help finance operations during these times. Drawing upon deposit accounts for this purpose is clearly not a desirable practice. As authorized by this bill, a modest amount of appropriated funds to provide NTIS with working capital to finance NTIS inventories and to provide support during low-cash periods would solve this problem.

Second, NTIS is not able to purchase needed capital assets unless it receives appropriations for them. Section 3 of the Act (15 U.S.C. 1153) provides, in pertinent part:

> It is the policy of this chapter . . . that each of the services and functions provided herein shall be self-sustaining or self-liquidating and that the general

public shall not bear the cost of publications and other services which are for the special use and benefit of private groups and individuals . . . .

Notwithstanding this mandate to recover the costs associated with producing NTIS products and services from the beneficiaries thereof, GAO has determined (Attachment I) that Section 2 of the Act of September 25, 1970 (15 U.S.C. 1526), the law governing the use of the trust fund, does not provide authority to use the fund for the purchase of capital assets. Obviously, despite the best intentions of Congress to have NTIS pay for itself, appropriations would be required to replace old equipment and provide new services that require new equipment unless the trust account mechanism is replaced.

ESTABLISHING A REVOLVING FUND

The General Accounting Office (GAO) in a June 5, 1979 letter to the Office of Management and Budget (OMB) reiterated earlier determinations that NTIS has been improperly utilizing the mechanism of a trust account to finance its operations and suggested that a separate working capital fund for NTIS be established by segregating a portion of the capital in the NBS working capital fund. (Attachment II) By a July 6, 1979 letter to GAO, OMB responded that it would establish a separate working capital fund for NTIS provided legal authority to do so could be found. (Attachment III)

Because of the different accounting needs and pracices of NBS and NTIS, segregation of the portion of the NBS working capital fund which was being used for performance of the clearinghouse function when NTIS was established would be impractical. Instead, this Bill would establish a revolving fund in the Treasury of the United States to be available to the Secretary of Commerce to fund the activities of NTIS and would authorize the appropriation of $5 million to provide NTIS with a source of working capital during low-cash periods to obviate its reliance upon deposit accounts. The Bill would also authorize NTIS to retain earnings to replace capital assets and inventories. The replacement of the trust fund by a revolving fund would be in accord with plans to modernize NTIS financial practices; would assist in matching costs with revenues; would allow for more accurate representations of NTIS' overall financial status; and generally would improve management control over NTIS operations. Attachment IV compares budget justification schedules under the current NTIS financial structure and under a revolving fund. The latter better portrays the total financial position of the agency. Attachment V compares financial reporting under the current structure and under a revolving fund. Statements produced under the latter structure would allow for a more thorough analysis of NTIS' financial operations.

MAJOR FEATURES OF THE BILL

Section 1 of the draft legislation specifies that the Act may be cited as the "Technical Information Clearinghouse Fund Act of 1982".

Section 2 would add a new Section 8 to the Act of September 9, 1950 (the clearinghouse statute). New Subsection 8(a) would establish the Technical Information Clearinghouse Fund (hereinafter "Fund") as a revolving fund in the Treasury of the United States, for use by the Secretary of Commerce, without fiscal year limitation, to carry out the activities authorized in the Act of September 9, 1950, and any other activities assigned by the Secretary to the clearinghouse.

New Subsection 8(b) would authorize inclusion of the following in the Fund: all fees, advances, and reimbursements received from any source for products and services furnished, or to be furnished, by the clearinghouse; all receivables, inventories, and other assets used in conducting clearinghouse activities at the time of the Fund's establishment or subsequently thereto; all receipts from the sale or exchange of property used by the clearinghouse and all receipts in payment for loss or damage to such property; and any sums appropriated for clearinghouse activities.

New Subsection 8(c) would authorize the Secretary of Commerce to use the Fund to pay all costs of conducting clearinghouse activities, including the payment of any financial obligations related to clearinghouse activities which were undertaken prior to the Fund's establishment or subsequently transferred to the Fund by law or in conjunction with any reorganization authorized by law.

New Subsection 8(d) would authorize refunds from the Fund of fees paid by mistake or in excess of that required.

New Subsection 8(e) would require the Secretary to transfer to the general fund of the Treasury at the close of each fiscal year any amount in the Fund that exceeds any present and reasonable future requirements of the Fund. Unlike the present law, monies could be retained to restore any impairment of the Fund. Replacement costs of equipment and inventories in most instances are higher than original purchase costs. By permitting funds to be retained to cover current and reasonable future needs, if products and services are appropriately priced, the need for appropriations to make up the difference between replacement and original costs would be avoided. Instead of the general taxpayer, the users of NTIS services and products would shoulder the burden of increased replacement costs.

New Subsection 8(f) would define "costs" to include direct expenses and charges for indirect and administrative expenses, including: accrued annual leave; uncollectible accounts; cost of sales; developmental costs; inventory obsolesence; depreciation of equipment to provide funds to replace capital assets, and financial obligations undertaken prior to the Fund's establishment or transferred to the Fund thereafter.

The broad definition of the term "costs" is consistent with the thrust of the policy established by the Congress with respect to recovering the costs of clearinghouse activities from users when it enacted section 3 of the Act of September 9, 1950 (15 U.S.C. 1153) and Section 2 of the Act of September 26, 1970 (15 U.S.C. 1526). That is, clearinghouse publications and services should be provided without causing any expense to the taxpayer by way of appropriations. (S. Rep. No. 537, 91st Cong., 1st Sess. (1969)). To accomplish this, users must be charged their fair share of all costs including those of acquiring and replacing inventories and equipment.

Section 3 would authorize appropriations of not to exceed $5 million to the Secretary of Commerce to provide working capital for the Fund.

Section 4 of the Bill would amend Section 3 of the Act of September 9, 1950 (15 U.S.C. 1153) to require that schedules of fees promulgated by the Secretary of Commerce for activities of the clearinghouse reflect, to the fullest extent feasible, the costs of the products and services offered.

Section 5 provides that the Bill shall take effect on the first day of the first fiscal year which begins after the date of enactment.

U.S. General Accounting Office,
Washington, D.C., May 22, 1976.

Mr. Meir S. Gabbay,
Chief, ADP Administrative Systems Division, Office of Organization and Management System, Department of Commerce.

Dear Meir: The National Technical Information Services (NTIS) accounting system design provides for an equipment account to record fixed assets financed from "trust fund" receipts. We do not feel that we can recommend approval of this feature of the system design since we would be approving a structure to account for apparently unauthorized acquisitions.

I touched on this in my January 29, 1976, letter to you. We see nothing in 15 USC 1153 and 1526 that would authorize the "trust fund" to acquire such assets.

It appears to us that the Office of Management and Budget and the Department of the Treasury erred in establishing the "trust fund" as a partial means of financing the activities of NTIS instead of using the authority of 15 USC 1526 to set up a branch within the Working Capital Fund of the Bureau of Standards (15 USC 278b). Had this been done and capital acquisitions been financed from appropriated funds transferred to the NTIS portion of the Working Capital Fund, the establishment of an equipment account in the system design would be appropriate. Depreciation on equipment financed through the Fund would, to the extent that it resulted in earned net income at the end of the year, be paid into the general fund in accordance with 15 USC 278(f).

If you accept our recommendation to account for NTIS's furnishing of goods and services as a part of the Working Capital Fund, we suggest that you consider capitalizing in the Fund that equipment in use and needed that was appropriation-financed as well as that erroneously financed with "trust fund" advances.

We are available to discuss this suggestion further if you desire.

Sincerely yours,

Richard W. Haycock, *Deputy Director.*

U.S. General Acounting Office,
Washington, D.C., June 21, 1976.

Mr. Meir S. Gabbay,
Chief, ADP Administrative Systems Division, Office of Organization and Management System, Department of Commerce.

Dear Meir: When I used the word "branch" in my letter to you of May 20, I did not mean to give the connotation that the National Technical Information Services (NTIS) and its funding would be a part of or subsidiary to the National Bureau of Standards (NBS).

What I visualized was a "splitting off" of a portion of the Working Capital Fund for the specific purpose of financing NTIS. The portion split off would be controlled and operated by NTIS entirely independent of NBS. Each would have a portion of the Working Capital Fund for its operation.

I am sorry I did not make this clear in my original letter.

Sincerely yours,

Richard W. Haycock, *Deputy Director.*

Comptroller General of the United States,
Washington D.C., June 5, 1979.

Hon. James T. McIntyre, Jr.,
Director, Office of Management and Budget.

Dear Mr. McIntyre: When the National Technical Information Service (NTIS) was established in September 1970 to perform certain functions formerly the responsibility of the National Bureau of Standards (NBS), the Office of Management and Budget (OMB) did not segregate a portion of NBS' working capital fund to finance the operation of NTIS.

As a result, NTIS has been improperly using trust funds to finance its operations. We called this to the attention of the Department of Commerce in May 1976 and suggested that they have OMB and Treasury establish a separate working capital fund for NTIS by segregating a portion of the capital in the NBS working capital fund. The Department made such a request to OMB in September 1976 and again in September 1978. To date the Department has been unsuccessful, even with our efforts to assist, in getting this accomplished.

In the meantime, NTIS designed an accounting system for its operations on the assumption a working capital fund would be established. We evaluated the design and informed NTIS and the Department over 2 years ago that we were ready to approve it.

We have been unable to ascertain why your Office objects to the establishment of the working capital fund. I would appreciate your letting me know so we can determine whether changes will need to be made in the accounting system design.

I am sending a copy of this letter to the Secretary of the Treasury.

Sincerely yours,

Elmer B. Staats,
Comptroller General of the United States.

Executive Office of the President,
Office of Management and Budget,
Washington D.C., July 6, 1979.

Hon. Elmer B. Staats,
Comptroller General of the United States, General Accounting Office, Washington, D.C.

Dear Mr. Staats: This is in reply to your letter of June 5, 1979, concerning the Department of Commerce proposal to establish a separate working capital fund for the National Technical Information Service (NTIS).

Our principal reason for not agreeing to the establishment of a new fund was our doubt about the availability of existing legal authority. Upon receipt of your letter, we made another review of our position. As a result, we will not object to the establishment of a new working capital fund for the NTIS if there is sufficient legal authority for the fund. If legal authority does not exist, we would not oppose submission of legislation to create it. This authority is required by the Department of Treasury, and is pertinent in our review of proposals for new accounts.

Thank you for your view on this issue.

Sincerely,

W. BOWMAN CUTTER,
Executive Associate Director for Budget.

COMPARISON OF BUDGET APPENDIX SCHEDULES

Schedule	Trust Fund	Public Enterprise Fund
Financial condition		X
Schedule of selected supporting data for business type budget		X
Revenue and expense		X
Program and financing	X	X
Object classification	X	X
Statement of receipts	X	X
Detail of permanent positions	X	X
Personnel summary	X	X

Senator SCHMITT. The hearing is adjourned, to reconvene tomorrow to continue the NASA authorization hearings.

[Whereupon, at 11:35 a.m., the hearing was recessed, to be reconvened the following day, Thursday, March 18, 1982.]

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